4 GREAT HOLIDAY GIFT PROJECTS

p.38 TESTED: 7 PORTABLE TABLE SAWS

p.36 WORKSHOP POSTER: CIRCULAR SAW BLADES

p.47 3D WOODEN PUZZLE

ISSUE #111
DEC/JAN 2018

CANADIAN Woodworking & HOME IMPROVEMENT

Build Textured Boxes p.26

TOP 10 Lumber Breakout Tips p.10

ALSO IN THIS ISSUE:

- Build a Custom Interior Door p.20
- Create a Tie Box p.64
- 52 Hot Products of 2017 p.52

HOT STUFF: TANKLESS WATER HEATERS

CANADIANWOODWORKING.COM

$6.97

PUBLICATIONS MAIL REG NO. 40035195

6 20058 70028 0 01

KING CANADA

EXCELSIOR

Introducing a new line of Scroll Saws that needs NO introduction!

This time-tested design provides a stable platform when cutting straight or on an angle. Unlike other scroll saws where the table is tilted for angled cuts, the entire head of this saw tilts 30° to the left and 45° to the right. This allows the user to better control the workpiece on a flat table surface, for a more safe and accurate cut. Solidly built upper and lower parallel arms keep the blade straight with minimal blade deflection, allowing for precise cuts and making this one of the most sought after scroll saws on the market.

Features Include:

- 120V 1.3 Amp Constant Torque Permanent Magnet Motor
- 12" x 18 1/2" Table Surface (XL-16)
- 13 1/2" x 23 1/2" Table Surface (XL-21)
- 14" x 32 1/2" Table Surface (XL-30)
- Finger-Operated Blade Changing Blade Clamps
- Accepts All 5" Pinless Blades
- Easy Access Speed And Tension Controls
- Onboard Dust Blower
- 2 1/2" Dust Collector Hookup
- Operation Manual And Two-Year Warranty

See your nearest King dealer today
For complete product details.. visit our website

www.kingcanada.com

Check out the Scroll saw and King Canada videos on YouTube channel

Canadian Woodworking & Home Improvement

CONTENTS

DECEMBER/JANUARY 2018

FEATURES

DEPARTMENTS

COVER STORY

Cover photo by Rob Brown

editor's letter

rbrown@canadianwoodworking.com

Expanded Format & Cover Update

You may have noticed this issue has undergone a few updates. The expanded format gives us a larger pallet for more great articles. We also brought in a whole different look to our cover, including a new logo. It's the same great magazine you've come to know and love, but now it's just a bit bigger and better!

This Issue

It's that time of the year again. Rather than venture out to stores and malls, or heartlessly risk shopping online, woodworkers across our great land are making their gift list, then heading into their shops to play elf before the holiday season. Giving a handmade gift as a Christmas present or as a hostess gift is always appreciated, and making it is half the fun.

I've filled this issue with some great gift projects, and you can also visit our website for more woodworking projects to build as gifts. Our cover project features small, textured boxes that make great gifts for people of all ages. Their size can be customized as needed, and the texture adds a unique element that is rarely seen with wood. If there's a tie-wearing man on your list, Drew Jessup takes you through the process of creating a tie storage and display box. If kids, or anyone young at heart, are on your list, check out Chris Wong's 3D puzzle. With lots of design and difficulty level options, this project will challenge people of all ages. The last project we have is a class train set I made for my son's kindergarten class. I machined all the parts, then I visited his classroom to teach the students how to assemble their own train. If you have a young child in your life, ask their teacher about doing something like this for their class. Also in keeping with the gift-giving season is our annual Hot Products, where we showcase lots of great products for woodworkers and DIY enthusists.

Don't worry, I haven't forgot about our regular columns. Our home improvement column covers how to build a nice interior door with mainly a table saw, Carl Duguay introduces the subject of tankless water heaters, and Rich Keller gets his hands dirty while testing out seven portable table saws under $500. Our regular *Top 10, Canadian Quotes, Know Your Tools, Finishing Touch* and *Workshop Poster* have lots of great tips and information, as well.

End of an Era

As always, last, but not least, we have Don Wilkinson's Woodchuckle column. After a decade of sharing his experiences – and bringing laughter to woodworkers across Canada – Don is wanting to spend more time with his family, and less time writing, so this will be his last column. A special heartfelt thank-you to you Don for all of the laughs you've given us over the years.

—Rob Brown

CANADIAN Woodworking & HOME IMPROVEMENT

Issue #111

PUBLISHERS
Paul Fulcher, Linda Fulcher

EDITOR
Rob Brown

ART DIRECTOR
Jonathan Cresswell-Jones

CONTRIBUTORS
Carl Duguay, Drew Jessup, Rich Keller, Don Wilkinson, Chris Wong

PREPRESS
Bonnie Wittek

PROOFREADER
Katharine Boggess

SUBSCRIPTIONS/INQUIRIES
Jennifer Taylor 1-800-204-1773

ADVERTISING
(519)449-2444

CANADIAN WOODWORKING & HOME IMPROVEMENT
One-year subscription (6 issues) $24.95 + tax
Single-copy price: $6.97

H.S.T. Reg. #878257302

ISSN 1921-6432 (PRINT)
ISSN 2371-9028 (ONLINE)

Publications Mail Agreement No. 40035186
RETURN UNDELIVERABLE CANADIAN ADDRESSES TO CIRCULATION DEPT. CANADIAN WOODWORKING PO BOX 286 DARTMOUTH, NS B2Y 3Y3

E-mail: circdept@canadianwoodworking.com

TEL. (519)449-2444 FAX (519)449-2445
e-mail: letters@canadianwoodworking.com
website: www.CanadianWoodworking.com

We acknowledge the financial support of the Government of Canada through the Canada Periodical Fund (CPF) of the Department of Canadian Heritage toward our periodical.

Paul Fulcher
Publisher & Advertising Director
pfulcher
@canadianwoodworking.com

Jennifer Taylor
Circulation
circdept
@canadianwoodworking.com

Carl Duguay
Web Editor
cduguay
@canadianwoodworking.com

Best Value Guaranteed

KMS Tools and Equipment

Tools For the Professional & Hobbyist

- Coquitlam
- Langley
- Abbotsford
- Chilliwack
- Kelowna
- Victoria
- Kamloops
- Calgary
- Grande Prairie
- Edmonton
- Red Deer
- kmstools.com

Magnum Industrial 10" Cabinet Table Saw

Hot Deal

- 2HP, 115/230V motor
- Precision self-aligning T-square fence
- Quick-change fence faces save time and improve efficiency
- Forged one-piece arbor for minimal saw run-out

Reg. $1679.99
MI-51100
$1549.95

MAGNUM INDUSTRIAL

Save $130

Magnum Industrial 13" Power Planer

Hot Deal

With Helical Cutterhead

- 2 HP, 110V, 15A motor with thermal overload protection
- 10,000 RPM cutterhead speed
- 1/8" max depth of cut
- 26 Carbide 2 sided blades included

Save $100

Reg. $749.99
MI-31160
$649.95

MAGNUM INDUSTRIAL

Magnum Industrial 8" Bench Top Jointer

With Helical Cutterhead

Hot Deal

- 1 HP, 120V, 12A motor with thermal protection
- 12,000 RPM cutterhead speed
- 1/8" max depth of cut
- 16 Carbide 2 sided blades included

Reg. $749.99
MI-81180
MAGNUM INDUSTRIAL
$599.95

Save $150

Magnum Industrial 10" Overarm Blade Cover

- 3 1/8" x 17" (80 x 432mm) blade cover dimensions
- Will fit most saws with very little modification
- Works well with saws that have anti-kickback knives installed
- Replace missing guards or improve existing ones

MAGNUM INDUSTRIAL

Reg. $439.99
MI-52100
$399.95

Save $40

Magnum Industrial Router Table

With Router Lift

- Heavy-duty router lift with aluminum top plate
- 32" x 24" Cast iron table top
- Adjustable router fence
- 2 1/4" dust collection outlet
- Sturdy steel stand with built in mobile base

Reg. $1499.99
MI-42150
$1299.95

Save $200

MAGNUM INDUSTRIAL

Magnum Industrial 9 1/4" x 11 3/4" Router Lift

- Above table fine adjustment gives clear view of increments for precision work
- Chain lift design eliminates bushings & ensure maintenance free longevity

Save $30

Reg. $399.99
MI-42100
$369.95

MAGNUM INDUSTRIAL

Freud 10" 80T Melamine Saw Blade

For Mirror Cuts In Double-Sided Melamine

- No need for a separate scoring blade
- Unique 38° tooth angle for fast and precise cutting

Hot Deal

Reg. $129.99
FRE-LU3A05
$79.95

Save $50

MADE IN ITALY

freud.

Magnum Industrial One Hand Bar Clamp/Spreader

300lb Clamping pressure

- Quick-release mechanism makes it easy to switch between clamping and spreading

6"	Reg. $16.99 MI-QGCHD6	$11.95	18"	Reg. $18.99 MI-QGCHD18	$13.95
12"	Reg. $17.99 MI-QGCHD12	$12.95	24"	Reg. $20.99 MI-QGCHD24	$14.95
			36"	Reg. $22.99 MI-QGCHD36	$15.95

MAGNUM INDUSTRIAL

Hot Deal

Save up to 30%

Magnum Aluminum Bar Clamp

- Cast iron head
- Lightweight aluminum bar & head

24"	Reg. $12.99 MAG-ALB24	$6.95
36"	Reg. $14.99 MAG-ALB36	$8.95
48"	Reg. $16.99 MAG-ALB48	$9.95
60"	Reg. $19.99 MAG-ALB60	$11.95
72"	Reg. $22.99 MAG-ALB72	$13.95

Save up to 46%

Hot Deal

magnum

Freud 6" 10T Dado Set

- Cuts 1/4" - 13/16"
- Square tooth design
- Includes 2 blades, a shim set, 3 chippers and case

Reg. $149.99
FRE-SD206
$99.95

Save $50

MADE IN ITALY

freud.

Magnum 3/4" Pipe Clamp

- Clamping faces are 1 3/4" square
- Multiple-disc clutch

Hot Deal

1/2 Price

Reg. $15.99
MAG-PC34
$7.95

magnum

Bessey Revo K-Body 3.75" x 12" Clamp

30% Larger Clamping Surface

- Accurate 90° angles
- Includes rail protection pieces to elevate workpiece from rail

Save up to 24%

Reg. from $54.99 to $99.99

BES-KR3512 - 12"	BES-KR3540 - 40"
BES-KR3518 - 18"	BES-KR3550 - 50"
BES-KR3524 - 24"	BES-KR3560 - 60"
BES-KR3531 - 31"	BES-KR3582 - 82"

$42.95 to $79.95

BESSEY

Sale ends 01/31/18

1-800-567-8979 kmstools.com Follow Us Tool Corner Blog

Automotive | Construction | Industrial | Power Tools | Welding | Woodworking

letters

Workshop Posters

I was wondering if there is an area on the website to print off the Workshop Posters, rather than removing them from our magazine copies? My son and I find them useful when we are working in the shop. For him as a young and upcoming woodworker, I know he likes the simplicity of them too. They are a very good reference to go to.

Kevin R.
Gibbons, AB

Hi Kevin,
I'm glad you and your son like the posters. They are included in our print issues, and they can also be found on our website for free. Workshop Posters on different types of wood finishes, drill bits, saw blades and more in the near future are available on our website, under the Resources tab, in our homepage's Navigation Bar.
— Rob Brown, Editor, CW&HI

Subscription Draw Winners

Gregg S.
Mississauga, ON
has won an 18V Hand Carry Air Compressor from RIDGID.

William F.
Sooke, BC
has won a $250 gift card from **Lee Valley**.

Subscribe or renew now for your chance to win!

Woodworking Students

I was at the woodworking show in Woodstock on the weekend, and signed up for a subscription to Canadian Woodworking & Home Improvement. I teach a grade 12 Construction / Woodworking course at Delta Secondary School in Hamilton. I was proud to wear my Canadian Woodworking T-shirt to class on Monday, and introduce my students to your magazine.

Thank you
Mr. Bogul

That's great - thanks for letting us know about your students using our magazine in class. Please note, that the Hamilton Woodworking Show is coming up, and the promoter is making a special offer to shop teachers and students.
Shop Teachers: Shop students get FREE ADMISSION to the upcoming HAMILTON WOODWORKING SHOW February 23-25, 2018
For more info:
www.WoodShows.com/ShopClass
1-905-779-0422
qina@woodshows.com
I hope to see you there!

shoptested

Dustless Routing Is at Hand!

Handheld routers are extremely versatile tools for woodworkers but notorious for generating drifts of chips and clouds of blurring, choking dust, and there's been no reliable way around it, until now. I've been routing for several months now with my plunge and fixed-base routers fitted with the Oneida Universal Dust-Free Router Hood and never worked so cleanly. The kit fits a host of router brands and models (their base template is very helpful). Molded of optically clear polycarbonate, the kit comprises a base-plate, a top-fitting "dome" with detachable hose port plus both tall and short interchangeable chip covers that snap on below the base as required.

For edge routing, one of the two chip covers surrounds the cut below the base, while the dome and dust port above effectively trap and draw away virtually all debris. When internal routing, the chip cover easily snaps off, while the dome above allows for adjustments and cuts to be made unobstructed and cleanly, yielding more accurate, safer freehand and pattern shaping. Even when doing deep internal routing with exposed edges, I've experienced clear sightlines, clean air and a mere veneer of dust on the shop floor, rather than the thick drifts of the past, and none on the workpiece. I'll never again use a handheld router without it. Information about the dust-free router hood, base template and dust extraction hose whip can be found at Oneida-Air.com

— Mark Salusbury

Grizzly Industrial

CHRISTMAS SALE OCT.30TH–DEC.31ST

- ALMOST A MILLION SQUARE FEET PACKED TO THE RAFTERS WITH MACHINERY & TOOLS
- 2 OVERSEAS QUALITY CONTROL OFFICES STAFFED WITH QUALIFIED GRIZZLY ENGINEERS
- HUGE PARTS FACILITY WITH OVER 1 MILLION PARTS IN STOCK AT ALL TIMES
- 24 HOUR ORDERING BY PHONE OR ONLINE • MOST ORDERS SHIP THE SAME DAY

14" DELUXE BANDSAW
30TH ANNIVERSARY EDITION

- Motor: 1 HP, 110V/220V, single-phase, 11A/5.5A, TEFC
- Precision-ground cast-iron table size: 14" x 14"
- Table tilt: 10° left, 45° right
- Floor-to-table height: 43"
- Cutting capacity/throat: 13½"
- Maximum cutting height: 6"
- Blade size: 93½" (⅛" to ½" wide)
- Blade speeds: 1800 and 3100 FPM
- Overall size: 27"W x 67½"H x 30"D
- Footprint: 23½"L x 18½"W
- Approx. shipping weight: 247 lbs.

INCLUDES QUICK-RELEASE BLADE TENSION LEVER

G0555LANV ~~$575.00~~ SALE $525.00 $139

17" HEAVY-DUTY BANDSAW
30TH ANNIVERSARY EDITION

- Motor: 2 HP, 110V/220V, single-phase, TEFC, prewired 220V
- RPM: 1725
- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast-iron table size: 17" x 17" x 1½"
- Table tilt: 45° R, 10° L
- Floor-to-table height: 37½"
- Cutting capacity/throat: 12¼"
- Blade length: 131½" (⅛" to 1" wide)
- Approx. shipping weight: 342 lbs.

Euro-Style Blade Guides

MADE IN AN ISO 9001 RATED FACTORY

G0513ANV ~~$925.00~~ SALE $875.00 $159

10" HYBRID TABLE SAW
WITH RIVING KNIFE & IMPROVED FENCE

New!

- Motor: 2 HP, 120V/240V, prewired 120V, single-phase
- Amps: 15A at 120V, 7.5A at 240V
- Precision-ground cast iron table with wings measures: 40½"W x 27"D
- Floor-to-table height: 35⅝"
- Arbor: ⅝"
- Arbor speed: 3450 RPM
- Max. depth of cut: 3¼" @ 90°, 2¼" @ 45°
- Rip capacity: 31" R, 18¾"L
- Overall size: 64"W x 40½"D x 35½"H
- Footprint: 21"L x 19½"W
- Approx. shipping weight: 371 lbs.

MADE IN AN ISO 9001 RATED FACTORY

FREE 10" X 40T CARBIDE-TIPPED BLADE

G0771Z ~~$775.00~~ SALE $750.00 $159

10" HYBRID TABLE SAW
POLAR BEAR SERIES TABLE SAW WITH RIVING KNIFE

- Motor: 2 HP, 110V/220V*, single-phase, prewired to 220V
- Amps: 16A at 110V, 8A at 220V
- Precision-ground cast iron table w/ wings
- Measures: 27"D x 40"W
- Footprint: 20"L x 21½"W
- Arbor: ⅝"
- Arbor speed: 3850 RPM
- Approx. shipping weight: 416 lbs.

MADE IN AN ISO 9001 RATED FACTORY

G0833P ONLY $995.00 $159

12-SPEED HEAVY-DUTY BENCH-TOP DRILL PRESS

- Motor: ¾ HP, 110V, single-phase, 9A
- Swing: 14"
- Drill chuck: ¼"–⅝"
- Drilling capacity: ½" steel
- Number of speeds: 12 (140, 260, 320, 380, 480, 540, 980, 1160, 1510, 1650, 2180, 3050 RPM)
- Quill flange/collar dia: 2.595"
- Table swing: 360°
- Table tilts: 90° left & right
- Footprint: 18" x 11"
- Approx. shipping weight: 148 lbs.

MADE IN AN ISO 9001 RATED FACTORY

G7943 ~~$349.00~~ SALE $325.00 $139

2 HP DUST COLLECTOR
WITH ALUMINUM IMPELLER

- Motor: 2HP, 240V, single-phase, 3450 RPM
- Motor amp draw: 9 Amps
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- Bag capacity: 5.7 cubic feet
- Portable base size: 21¼" x 33½"
- Bag size (dia. x depth): 19½" x 33"
- Powder coated paint
- Approx. shipping weight: 122 lbs.

MADE IN AN ISO 9001 RATED FACTORY

G1029Z2P ~~$355.00~~ SALE $325.00 $139

6" JOINTER
WITH KNOCK-DOWN STAND

- Motor: 1 HP, 110V/220V, single-phase, 14A/7A
- Prewired voltage: 110V
- Table size: 6¼" x 47¾"
- Number of knives: 3
- Cutterhead speed: 5000 RPM
- Cutterhead diameter: 2½"
- Maximum depth of cut: ⅛"
- Cuts per minute: 15,000
- Fence size: 29¼" long x 4" high
- Approx. shipping weight: 252 lbs.

G0813 ONLY $525.00 $139

12" BABY DRUM SANDER

- Sanding motor: 1½ HP, 115V, single-phase, 13A
- Conveyor motor: ⅛ HP, 115V, single-phase, variable speed 5-55 RPM, 0.3A
- Drum surface speed: 2127 FPM
- Maximum stock dimensions: 12" wide x 3½" thick
- Minimum stock length: 8"
- Minimum stock thickness: ⅛"
- Sanding drum size: 4"
- Sanding belt size: 3" x 70" hook & loop
- Dust port size: 2½"
- Feed rate: 2.5-17.3 FPM
- Approx. shipping weight: 166 lbs.

G0459 ~~$599.00~~ SALE $575.00 $139

15" HEAVY-DUTY PLANER

- Motor: 3 HP, 240V, single-phase, 14A
- Maximum cutting width: 15"
- Maximum stock thickness: 6⅛"
- Minimum stock thickness: ¼"
- Maximum cutting depth: ⅜" for 6" wide board, ⅛" for full width
- Cutterhead diameter: 3"
- Overall dimensions: 32" wide x 23½" high x 28" deep
- Footprint: 20" x 20½"
- Approx. shipping weight: 300 lbs.

G0815 ~~$1150.00~~ SALE $1095.00 $199

PRICING CODE 17CANWW
MENTION THIS CODE WHEN PLACING YOUR ORDER
19205

1-800-523-4777 **grizzly.com**

VIEW VIDEOS AT grizzly.com

TECHNICAL SERVICE: 570-546-9663 • FAX: 800-438-5901

2 GREAT SHOWROOMS!
BELLINGHAM, WA • SPRINGFIELD, MO

BUY NOW, PAY LATER with Affirm
Choose your monthly payments at checkout

webshavings

Tool Reviews

SuperMax 16-32 Drum Sander

View these reviews and more at:
canadianwoodworking.com/**reviews**

Events

The Buildings Show
Nov 29 - Dec 1, 2017
Toronto, ON

Toronto Interior Design Show
Jan 18 - 21, 2018
Hamilton, ON

Woods to Know

Yew (axus brevifolia)

Best Build

Check out the **Woodworking** section of our forum for our latest "Best Build" thread – a yarn storage cabinet. This month's winner, Jamie Nisbet, wins a **Veritas Dual Marking Gauge** from **Lee Valley.**

To find out more about this project, go to: **forum.canadianwoodworking.com** or simply go to **CanadianWoodworking.com** and click **FORUM.**

Video Links

www.canadianwoodworking.com/**videos**

Arbortech Turbo Plane

Canadian Quotes:
Christina Hilborne

Free Plan

Two-Sided Picture Frame

Build a few of these great projects and you'll have some wonderful gifts for family and friends for the coming holiday season.

View this plan and more at:
canadianwoodworking.com/free-plans

Product Watch

Liquid Nails Fuze*It All Surfaces

This low VOC and low odour construction adhesive features a new hybrid technology that bonds nearly everything to everything – on porous or non-porous, and wet or dry surfaces. It offers instant grab and is two times stronger than fasteners alone.
www.LiquidNails.com

Woodhaven Drop Ceiling

These tongue and groove MDF laminate ceiling planks have the look of natural wood – from rustic knotty pine and weathered driftwood to sophisticated cherry. They're quick and easy to install and a typical ceiling can be completed by a single person over a weekend.
www.Armstrong.com

Forum Thread

Check out these home improvement threads at ***forum.canadianwoodworking.com***

- **Water seeping into the basement advice** – Learn about some of the preliminary steps involved in dealing with water seeping into a basement.
- **Old style electrical panel options** – Read about how you can deal with older electrical panels.
- **200 year old log cabin reno** – Follow along as a forum member discusses a renovation on a 1820's era log cabin.

Got a question? Join our forum so you can ask our skilled and experienced members any home improvement question you like. It's free, and is just a click away.

NEW

versatility. unmatched.™

DTSC, ETSC, RTSC - Consistent sanding performance either cordless or corded.

Battery pack AC Adapter

NEW Cordless Sanders

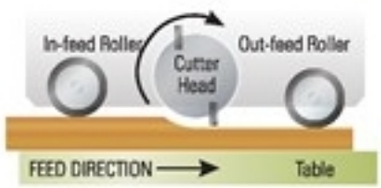
SERVICE all-inclusive

festoolcanada.com

FESTOOL.

Tools for the toughest demands

Benchtop Thickness Planers



Also called **lunchbox planers**, a benchtop thickness planer is a cost-effective way to machine lumber to final thickness. Once one face of a board has been flattened with a jointer, use a planer to dress the opposite face parallel to the first, and to a uniform thickness. The infeed roller above the material pulls the wood in and secures it for the cut, then the cutterhead dresses the wood before the outfeed roller keeps downward pressure on the workpiece. A benchtop planer will work well for most hobbyists, and even many professionals. Some models have two speeds, as well as preset depth stops for repetitive cuts at common settings. Most cutterheads contain replaceable (sometimes double-sided) HSS knives. Though expensive, a helical cutterhead produces a smoother surface, especially when working with figured material. All planers are loud.

Price: $200 – $800
Planing Width: 12" – 13"
Planing Thickness: About 1/4" – 6"
Planing Length: 12"
Max. Removal Per Pass: 1/16"
# of Knives: 2 or 3
Weight: 50 – 100 lb

Get the Most Out of Your **Benchtop Thickness Planer**

Keep it Light
Light cuts of no more than 1/16" per pass will leave a nicer surface. Remove no more than 1/32" per pass if using wide or dense boards.

Smooth Sailing
Keeping the table clean and waxing it from time to time keeps the material moving through the planer smoothly.

Keep it Sharp
The blades are replaceable, and often two-sided. Replacing them leaves a smooth surface that is easier on the machine.

Rotate it
If the planed surface of a board isn't smooth, end-for-end the board. Because of the grain direction, a board may chip heavily in one direction and not the other.

Dust Collection
Hooking up a dust collector to a planer will help control the large amount of chips that are created and may leave a smoother surface.

Photos by Manufacturers Illustration by Len Churchill

OUTDOOR
POWER EQUIPMENT from MAKITA

18V x2 LXT POWER-ASSISTED
WHEELBARROWS

Battery Box Holds Two Selectable 18V Batteries / Operates using (1) 18V Battery at a time

Wheelbarrow with **Bucket**
Dumping Feature / DCU180ZX2

Makita®

Wheelbarrow with **Flat Dolly**
Removable Sides / DCU180ZX1

Twin LED Job Lights

Brake Lever with Locking Mechanism
prevents accidental start on a slope (Front Wheel)

Variable 2-Speed, Reversible

Maximum Climbing Capacity
12°

18V LITHIUM-ION

Detachable Rear Wheels!

Becomes a traditional Wheelbarrow when rear wheels are replaced with legs!

XPT

Maximum Loading Capacity
287 Lbs
Move heavy loads with NO BACK PAIN

Batteries & Charger Sold Separately

Rapid Charging System
DC18RC

NEW!

6.0Ah BL1860B
with Charge Level Indicator
197424-0

5.0Ah BL1850B
with Charge Level Indicator
196675-2

4.0Ah BL1840B
with Charge Level Indicator
196401-9

3.0Ah BL1830B
with Charge Level Indicator
194205-3

makita.ca | outdoorpower@makita.ca

topten

Top 10 Lumber Breakout Tips

Breaking out lumber begins the process of turning rough material into a finished project. Complete this step properly, and you'll have an easier time with all the other steps.

BY ROB BROWN

1 Avoid Twists and Warpage – When purchasing lumber, make sure the boards are as straight as possible, especially boards that will supply you with the longest parts of your project. Even if you can machine the required parts from the board, a piece of heavily warped lumber will tend to move more than average once it's been turned into a furniture part.

2 Say No to Knots – Knots can cause wood to twist and warp, they add structural weaknesses to parts, and depending on the species and project, can be an eyesore. If knots are in your material you can always cut around them, but it does take time and planning.

3 Let Lumber Acclimatize – Letting wood sit in your shop for a while before cutting into it allows it to become at one with the moisture content in your shop. Planning and patience will become more important, or you can store lots of wood in your shop so it's ready for action when you are.

4 Check the Moisture Content – Generally speaking, the moisture content of purchased lumber is acceptable, though if you don't luck out you'll pay for it with a project that moves much more than you want.

5 Maintain Your Machinery – Jointers that don't leave one board face flat and straight, and planers that chip wood or leave heavy snipe, will not help you create square, usable stock for cutting joinery in. Even mitre and table saws need to run true and create square cuts, to break out lumber accurately.

6 Cut to Rough Dimensions First – Once you have marked where the project parts will be cut from your boards, cutting to rough length or rough width will make breakout much easier and more accurate. Dressing 8'-long x 10"-wide boards isn't easy.

7 Don't Hate All Waste – Some parts can be rough cut from a board on an angle so its grain is parallel to the freshly cut edge, producing a more visually appealing workpiece. Extra thick pieces can be rotated slightly then dressed to create quarter cut / rift cut stock for aesthetics and function.

8 Use Just One Board – Whenever possible, obtaining all your parts from just one board will give you more consistent colour and grain. It's surprising how different boards can be, even though they're the same species.

9 Dress Once – When machining parts of like thicknesses, plane them all at the same time to ensure they are all exactly the same thickness. Doing so will help avoid slight discrepancies while machining joinery.

10 Machine and Assemble Promptly – Don't let parts sit around before machining joinery and assembling the project, as parts can warp. This causes joinery not to fit as tightly, or assembly to be more difficult. Also sunlight causes discolouration in weird spots while furniture parts sit around the shop, even if they're stacked neatly.

ROB BROWN
rbrown@canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Layout Tools for a Small Shop *(June/July 2015)*, Drilling Accessories *(Aug/Sept 2016)*

Photo by Rob Brown

Planning a DIY Project

Double Entry Shed 12' x 8' 2758-091

Bunkie with Horizontal Siding & Shakes
16' x 20' 2854-859

Muskoka Double Chair 6335-503

Pit Toilet Outhouse 4' x 5'
2655-971

Here's How.

Home Hardware Building Centre is your destination for project plans & materials. We have hundreds of projects for your home or cottage.

Complete packages, plans and instructions, with permit quality blueprints available. Our step-by-step assembly instructions include easy to follow drawings to help you build.

Bring us your Projects BIG and small

*Included with material package purchase.

18' x 10'
Canoe/Kayak
Rack
2853-010

Play Video

CATALOG DOWNLOAD

Home hardware building centre

homehardware.ca

Christina Hilborne

…on exotic woods, design inspiration and living and working on the west coast.

BY ROB BROWN

How long have you been building furniture?
22 years

What sort of furniture do you specialize in?
Contemporary, mixed materials. Mainly tables, benches, desks and the occasional bed and dresser.

Tell us a couple of interesting things about your personal life.
The west coast forest is my church and my counselor. I don't eat, wear, or use animal products in my designs.

If you were not a furniture maker what would you be?
Dr. Doolittle or a Canadian Jane Goodall

In order, what are the three most important items in your shop apron?
I don't wear an apron – I wear jeans and keep my measuring tape hooked on my front right pocket and a pencil in my back left.

Do you prefer hand tools or power tools?
Power! I'm not very patient. Or accurate, for that matter. I especially like a CNC router. I can almost hear eyes rolling.

Solid wood or veneer?
Solid.

Figured wood or straight grain?
Straight.

Flowing curves or geometric shapes?
Both. I've been drawn to square shapes since I was a kid – my first favourite car was the Mini, later the Lada Kossak and 70s Ford Bronco, and now the Mercedes G Class. And I love houses made of shipping crates! But I'm also entranced by spirals, curves and repetitive circles.

Favourite wood?
Black walnut and edge grain Douglas fir.

Least favourite wood?
I'm not a fan of exotic woods, not because they're not beautiful, but because they're from far away and require a lot of fossil fuel to get here. If I lived in Hawaii I'd be using Koa all the time. Also, given that they come from so far away, I can't be sure how they were logged … in a responsible sustainable way or greedy, destructive clear cut? So when I'm not working with Kirei board (such a great panel product, except not always fun to work with) I buy salvaged timber from small local mills as much as possible. It's such a cool experience, driving into a big yard piled with huge logs and slabs and an Alaskan mill in the centre. I say I need a chunk of fir or cedar in such-and-such dimensions, and they cut it while I watch.

Lead Photo by Al Smith (AlSmith.com)

Age – 51
Christina Hilborne Studio **www.christinahilborne.com**
Location – Victoria, BC
Education – Benchwork and Joinery program at BCIT
Anderson Ranch, Snowmass CO – Japanese Joinery Course
Anderson Ranch, Snowmass CO – four-week residency
Emma Lake Collaboration 2006, Hawaii Collaboration 2016

Big-Boned Ballerina – The 'body' of this piece is a solid chunk of Douglas fir. Hilborne made this piece after attending the Emma Lake collaboration in Big Lake Saskatchewan, where she was introduced to, and fell in love with, surface texturing combined with metallic leafing, thus the silver-leafed bubbles. (Photo by Christina Hilborne)

Chastity – Hilborne made this wall sculpture during a six-week residency at Anderson Ranch, in Snowmass, Colorado. While building this piece she experimented with a few of new techniques, such as metalsmithing and text transfer. (Photo by Christina Hilborne)

quotes

I'm an afternoon and evening worker. I'm not a super early riser and when I get up I like to make veggie juice, shower, putter in the garden and do some yoga. After that, and some coffee, I'm ready to work. Well … clean up from the day before, and then work.

I don't see myself as a true woodworker – I don't live and breathe woodworking. It's more something I ended up doing because I enjoyed it and was vaguely good at it. I do things simply, and my favourite parts of a project are the design part and the finished part. There's a sense of relief – usually mixed with surprise – that it turned out well and that the client is going to love their new piece.

I don't know where I get my design inspiration from. I've always had trouble answering this question … I make what pleases my eye. I don't see something and say, "Oooh I'm inspired, I'm going to make an end table based on that thing I just saw." I just start doodling, and the doodle takes a shape that I find attractive. That being said, it's clear that being a child of an architect in the 60s and 70s shaped my aesthetic. My dad had a distinct sense of style, and I have inherited it. Thanks, dad.

My work says I was a child of the 60s. And it also says, if people look a little closer, that I care about our planet, the environment. Kirei board is made out of what used to be a waste product – sorghum offcast. When working in solid wood, I use local salvaged timber or repurposed wood around 80% of the time. I guess it also says I'm stubborn – by no means am I wealthy, but for some reason I keep doing it.

I am so lucky to have easy access to massive chunks of red cedar and Douglas fir. Often the slab determines what the design will look like.

I would tell up-and-coming makers two things: 1) Create a series of smaller pieces that you can reproduce fairly easily – these will tide you through between commissions; 2) Have a secondary source of income at least for the first five years.

I prefer commissions – I really enjoy working closely with clients and having them be a part of the design process. In the end they feel like they had a hand in the piece and like it that little bit extra.

ROB BROWN
rbrown@
canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Karen McBride *(Aug/Sept 2016)*, Arthur Perlett *(Oct/Nov 2015)*
SLIDESHOW: To view a slideshow of Hilborne's work, visit the Videos section of our website.

INFO: DIFFICULTY – 1/5, LENGTH/TIME – 2/5, COST – 1/5

Build a Kids' Train Set

This fun train set is a simple project to make, will introduce kids to how enjoyable woodworking can be and will allow you to spend some time with your children.

BY ROB BROWN

My son is in senior kindergarten. Wanting to spend time with him, and show him how much fun woodworking could be, I talked to his teacher about a woodworking project we could do with the whole class. I built enough train cars so each child in his class could assemble one, then I visited my son's school to spend an hour with his class to put everything together. The kids each had one train car to bring home to their parents after we were done.

Talk to the school

When I mentioned this project to my son's teacher, she was thrilled. We picked a day for me to visit, and I set to work building a set of trains that the kids could assemble. We talked about the different skill levels in the class, as I wanted everyone to have a fun and successful time assembling their train. I decided to make four different cars, each with a slightly different level of difficulty. Once complete, the cars would join together to make a long train.

Design

The class has a few train cars, as well as a bunch of track sections. I figured if we were going to make trains, they should run on the track they had. I designed the train cars to be on the simpler side, but the sky is the limit.

All the train cars have a flat base, a middle section that gets screwed to the base, four wheels that get screwed to the base, and either one or two screw eyes or hooks that get screwed into the front and/or back of the base. The boxcar and caboose each have an additional roof piece that gets screwed to the top of the middle section.

Photos by Rob Brown

Safe Stop Blocks – When making multiple pieces be sure to use safe and consistent practices. Here, Brown clamped a stop block to his rip fence so he could butt the workpiece up against the block and run it past the blade. The offcut isn't trapped tightly between the stop block and the blade, and won't cause any harm.

Round Windows – Standard 3/8" shop-made plugs glued into holes in the engine give the look of a window and are very easy to make. A colourful, contrasting wood adds to the fun look.

You could easily leave the smokestack and roof off the engine so the kids could glue them in place, and add a headlight or other details to increase the level of difficulty. There are many details that could have been added to all of these cars to make the assembly more challenging. I avoided using glue in the classroom, as I didn't think the kids were up for that challenge.

The last detail I made sure of simplifying was to only use #6 screws. I didn't want to give the kids even more to think about while assembling the trains. I did end up using two types of screws though – 1/2"-long pan head screws to attach the wheels and ¾"-long flat head screws for everything else.

Production line

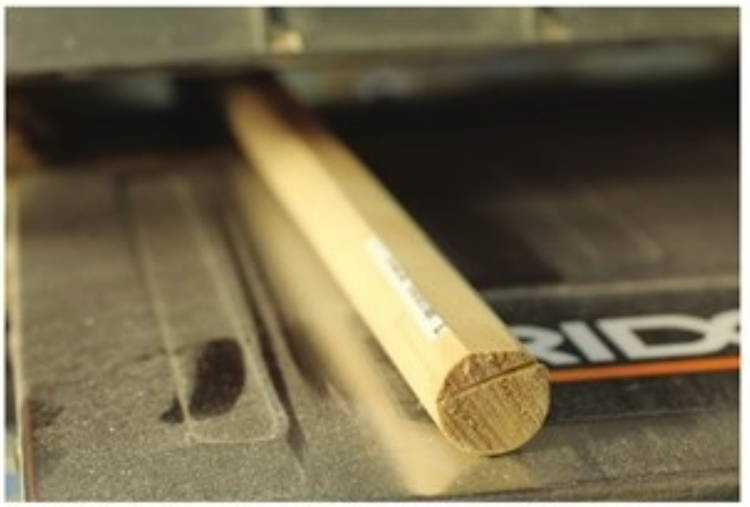
When setting up all the machining processes for these parts, ensure you're as accurate as possible. Accuracy on your part makes it easier for kids to be successful assembling the parts.

It's always important to source your hardware first, but even more so when creating a small production run of pieces. The thought of creating well over 100 tiny wheels didn't appeal to me at all. I placed an order from Workshop Supply for enough 3/4"-diameter x 3/16"-wide wheels for the project. At 10 cents apiece, they brought a smile to my face when they arrived at my door.

When creating all of these pieces make extra parts. With all the different setups it's easy to make a mistake.

Start down low

As these train cars are built on top of the bases, so that's where I started. The width of the base had to be about 1/32" wider than the inside width of the track. Since the middle section of the track was 3/4" wide, I made the bases 1/32" wider than 3/4". I went with a thickness of 3/8" and a length of 2-3/4" for the bases. The only difference was the engine bases had a sloped front, which I cut when I cut the bases to length. The caboose and boxcar roofs were also the same size as the bases, so I cut them now. While I was at it, I ripped enough material for the engine roofs, though I didn't cut them to final length yet.



Add a Flat Surface – By running a length of dowel rod through a planer, you will be left with a flat surface. It's often safest to cut round parts to length with hand tools.

Lots of Holes – By using a simple wood fence and a pair of wood stops, Brown was able to quickly and accurately drill holes in all of the bases and roof sections that needed it. Set the depth to leave the screw heads slightly below the surface of the workpiece.

Middle sections

I made the middle sections of these cars from spruce, and other than the tanker cars and the front portion of the engine, they were all the same width and thickness. I machined long lengths then cut the parts to length.

The cabooses and engines have 3/8" holes drilled in them, so that can be done next. Contrasting plugs can now be glued into the engine windows.

The middle sections of the tankers and the front sections of the engines were cut from a 4' length of 1"-diameter dowel I purchased from the hardware store. To create the flat section on the underside of these parts I just ran the length of dowel through my planer a few times. Be careful not to take too much material off, as the wheels may come into contact with the sides of the dowel.

Countersink and pilot holes

To ensure these parts all come together properly, I countersunk holes in the bases and roofs, and added mating pilot holes in the middle sections.

Transfer Hole Locations – Align the middle sections with the bases and use a sharp pencil to transfer the hole locations to the underside of the upper sections. Drill pilot holes in the upper sections to make alignment during assembly simple.

Eye and Hook Holes – Brown adds pilot holes to locate the screw eyes and hooks in the end grain of the bases.

Glue Your Engines – A light coat of glue, which is rubbed into the end grain faces, followed by a bit more glue, will help keep the two engine halves secured to each other. Ensure the flat bottoms of both parts are aligned while the glue dries.

Start with the countersink holes in the bases and roofs. A pair of countersink holes for #6 x 3/4" screws are centered on the bases and roofs, and are 5/8" away from the ends. The holes should be drilled deep enough so the screw heads finish slightly under the wood's surface. The only roof I didn't add countersink holes to is the engine roof, as I glued those directly to the engine's main section. These holes are all drilled on the drill press with a fence and stop to quickly and accurately position all the parts.

Next are all the 3/32"-diameter pilot holes in the middle sections that correspond to the countersink holes in the bases and roofs. Using one of the countersunk bases, align the two parts and use a sharp pencil to poke through the countersink holes and mark where the pilot holes should be drilled. Drill a single pilot hole in the underside of the square engine section, and mark the front and back of this section so you know where to glue the rounded portion of the engine onto it. Don't worry about the hole in the rounded section of the engine just yet. Be sure to drill pilot holes in the middle sections of the cabooses and boxcars, so their roofs can be attached.

Screw hook and eye pilot holes are next. This is where you have to divide the different bases up, as the engine only gets one pilot hole in its back edge, the cabooses get a hole in the front edge, and the rest get holes on both ends. These holes are centered on the end grain of the part, though be sure to double check the pilot hole size for the screw hooks and eyes you have.

Small Roofing Job – Glue the engine's roof directly to the top of the engine.

The final set of pilot holes are for the wheels. These holes are centered on the thickness of the bases, and are centred 3/8" from either end. I drilled all these holes on the drill press, again with a simple fence and a couple stops.

Assemble the engine

End grain joints aren't overly strong, but they're good enough for this application. I applied a bit of glue to both the mating end grain faces, rubbed it in, added a bit more glue then brought the parts together and clamped them. Just make sure the flat undersides are even with each other during glue-up.

Teach Your Child – With his daughter looking on in interest, Brown teaches his son how the different train cars get assembled, so his son can teach his classmates.

Now that the engine middle sections are together you can use a screw to fasten an engine base to an engine middle section, mark the location of the pilot hole in the round portion of the engine, and drill that hole. Repeat for all the engine sections.

A 1/4" hole can now be drilled into the upper edge of the engine for the smokestack, as well as the upper face of the caboose roofs. Cut and glue a length of purchased dowel into these holes. To complete the engines you can glue their roofs in place. A hole also has to be drilled into the top of each tanker middle section to accept the mushroom plugs. Once these holes have been drilled, you can glue in the plugs.

Prepare for the big day

I brought my son into my shop and showed him how all the train cars went together. This gave him some confidence in his skills, and also allowed him to talk to his classmates about how they went together. He felt great about teaching his friends a bit about the trains.

My son's teacher asked the kids to bring in a #1 Robertson screwdriver, so they could all work on the trains at the same time. About half the students brought a screwdriver in, but sharing screwdrivers worked fine. I first talked about safety, then my son talked a bit about how the parts went together. It was a busy hour, but all the kids had a train car to play with when we were done. Some kids needed no help at all to put their train car together, while others needed help with every step, but I'm pretty sure all the kids had fun doing it.

When we got home I realized I had a few new problems. My son now wanted a lot more of these trains to put together, and my daughter wanted me to come into her class so they could assemble trains. I guess having keen kids is a good problem to have.

ROB BROWN
rbrown@canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Toy Train *(Dec/Jan 2008)*, Woodshopasaurus Rex *(Dec/Jan 2008)*, Children's Blocks *(Dec/Jan 2012)*

INFO: DIFFICULTY – **2/5,** LENGTH/TIME – **3/5,** COST – **3/5**

Build an Interior Door

Building a set of doors is a great way to customize the interior of your home. Design options are almost endless, and it doesn't take much time or effort to build solid, timeless doors.

Photos by Rob Brown

BY ROB BROWN

The approach I took with these doors was to keep the design and joinery simple, so I could build them with minimal time and effort. Other than for breakout, I stuck with the table saw for pretty much all the joinery. You could easily add more stiles or rails to create a door that matched something existing, or even to change the overall look of the doors. The general approach would be exactly the same, but it may take a bit longer to construct.

I built these two doors for a bedroom closet, but they could also have been used as any interior doors. The only difference is surrounding how they're installed.

Materials

Because these paint-grade doors would be in a very low-traffic area of our home, I selected poplar from which to machine the frame. Soft maple would be a bit more appropriate if the doors would be hung in a more central part of our home.

For the panels I opted for were 1/2"-thick PureBond plywood from Columbia Forest Products, as I like the formaldehyde-free adhesive. The 1/2" plywood provides a fair bit of strength yet is very easy to manage while working with it.

How big?

A quick check of my door opening gave me the information I needed to build the doors. I divided the opening width in half to give me my overall door width, and I marked the overall height as well. In theory, I made the doors to fit perfectly in the opening, then I could trim them to fit. This gave me a bit of flexibility during construction, and allowed that the finished gaps were not too large. I also checked for square, and made a few notes about what I found.

Before you start making sawdust, you should make a cut-list showing all the overall dimensions of the parts, and the dimensions of the joinery that will need to be cut.

Break out the materials

Starting with 6/4 stock, I cut the parts to rough size, jointed and planed them all to final thickness of 1-1/4" then ripped them all to final width. The stiles and upper rail finished at 3-1/2" wide, while the bottom rail finished at 7" wide. These dimensions don't need to be adhered to too closely but are a starting point for your design. Most interior doors are 1-3/8" thick, but I ended up needing to remove a bit more material to create smooth surfaces on one of the stiles.

I also cut the PureBond plywood into oversized panels, as I needed to expose one clean edge in order to create an accurately sized groove that would accept the panels perfectly. Working with the factory edge of any sheet good can be risky, as they are sometimes slightly rough and uneven.

Joinery

As I mentioned, I stuck to my table saw for the joinery of these doors, as it's simple and fast. First, I installed a dado set that would create a groove that would accept the panels

Shop-Made Tenoning Jig

With only three parts, you can make a simple and effective tenoning jig to hold medium-sized workpieces upright when working on your table saw. This jig was designed for my General T-Fence, so it may have to be modified to fit your fence. The fit to the fence is important, so there is no movement between the jig and the fence. While in use, the jig holds the workpiece perpendicular to the table, while it's run over the blade. The exact dimension of the parts isn't crucial but will give you somewhere to start.

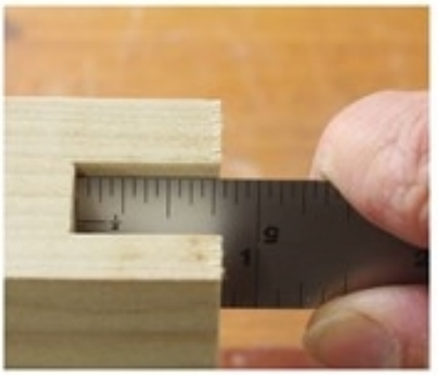
First, cut a piece of 3/4"-thick plywood to 3" wide x 17" long. Next, machine a piece of solid 14" x 2" x 1-3/4". This piece will be what fixes the jig to the fence, and it has to be machined very accurately to do so. I cut a rabbet in one edge of this piece, so when it was attached to the piece of plywood it would be tight enough, but not so tight that the jig couldn't slide on the fence. The upper lip of the rip fence's face will fit into this rabbet, and the plywood will run on the face of the rip fence. In use, the lowest edge of the large solid piece runs on the center metal portion of the rip fence, while the upper face of the rabbet should be cut to leave a slight gap between itself and the upper face of the rip fence.

To test the fit before assembly, clamp the parts together and see how it runs. A light pass with a hand plane might be needed to fine-tune the fit. Glue and screw these two parts together at a right angle, and so the bottom of the plywood is about 1/2" above the table saw's top surface. The last piece of solid, which is about 6" x 1" x 3/4", is machined and attached to the plywood. This piece helps keep the workpiece perpendicular to the table during use. Depending on how much material is being removed, and what species I'm working with, I either clamp the workpiece in place during the cut, or just use my hands to hold it. A bit of wax on the inner surfaces of the plywood and larger solid piece help keep the jig moving freely.

Simple and Straight – Brown holds the workpiece in place with his hand, as long as the cut being made isn't too aggressive, or the material being cut isn't too dense.

A Nice Fit – The fit between the piece of plywood and the large solid wood piece should be snug enough so the jig doesn't easily flop around during use.

Reference Off the Fence – The piece of solid wood should be machined so its bottom edge rides on top of the metal portion of the fence, and guides the jig parallel with the table saw's top surface.



How Long? – In order to cut the loose tenons to size, Brown measures the depth of the grooves then doubles that distance. He went with 1-1/2" total, in order to stay on the small side, rather than risk the joint not coming together.

Make it Obvious – Because the joints between the rails and stiles will likely move over the years, add a small reveal along the edge of the rails, in order to make the joint look obvious.

perfectly. Shims are going to be needed. Take your time here, as it will save a lot of time down the road. Also, don't make the groove at all too tight, as when you're fitting the long side of the panel into it, the fit will be tighter than you think. Too loose isn't good either though, so be careful with this setup.

Set the rip fence to position the groove – I opted to move the panel slightly back from the centerline of the solid wood frame to give the panel a larger setback from the frame on the visible face of the doors. The exact location isn't crucial though.

Once all the grooves are cut into the stiles and rails, it's time to focus on the grooves across the end grain of the rails. Loose tenons, made of the same material as the panels, will be used to fix the rails to the stiles. A tenon jig can be used here, but I have a simple shop-made device that does a great job. See the sidebar for more information about how to make your own, and how to use it. I now cut the grooves in the ends of the rails.

Loose tenons

From the same material from which that the panels will be cut, I ripped one long length to use as loose tenons. I made sure it was about 1/16" narrower than needed, as I didn't want to risk any problems during assembly. I then cut the loose tenons to length and eased their edges to make them easier to install during assembly. The loose tenons for the upper rail were cut about 2-1/2" long, while the lower loose tenons finished about 5-1/2" long. Any excess that protruded from either end of the assembled door could always be trimmed later.

A small reveal

When building projects, the goal is always perfection, but that's not always the result. From time to time we have to realize that joining pieces will not remain perfectly flush, and to pretend otherwise only makes the project look poorer in the long run. The joint between the rails and stiles will likely crack slightly over time, and with a few coats of paint, a dark line will appear. To camouflage the joint, a slight reveal can be machined into the ends of the rails. I set up the table saw blade to cut slightly more than 1/16" high, then adjusted the rip fence to take the same cut. Each of the rails was passed over the blade, leaving a small reveal.

Cut the panels

Trim the panels slightly smaller than the opening between the rails and stiles, then test their fit. They will likely be slightly tighter than you want, so a bit of white wood sanding is all that's needed to allow the panels to fit into the grooves nicely. I also heavily eased the edges of the panels, so assembly would go even smoother.

First Sub-Assembly – Glue one rail to one stile, then add the panel, for the first glue-up. Trying to do it all at once is a recipe for disaster.

On the Safe Side – Before the second sub-assembly, Brown assembles the door to double check that it will fit.

Mitre the Trim – With a table saw mitre sled, Brown makes a slow and accurate cut to produce a perfectly mitred piece of trim.

Attach the Trim – A 23g pin nailer is great for light-duty tasks. The pins keep the trim in place until the glue dries.

Assemble the doors

Start with gluing one rail to one stile, along with adding the panel. Apply glue to the loose tenon and to the surface of the grooves that will accept the loose tenon, as well as the groove on the end of the rail. Bring the rail and stile together so their outer edges are flush. A bit of glue on the inside of the panel grooves is next. Now the panel can be added, clamped in place in both directions, and when the rail and stile are square, left to dry.

The next sub-assembly will involve gluing the rest of the joints and loose tenons and bringing all the parts together. When gluing the lower rail to the stile, I leave the lower half of the joint without glue, so it can move with the seasons. The loose tenon will still keep the parts in line though.

Add some trim

Though not necessary, the trim adds depth to the door, and in my opinion, gives a nicer look. Rip 1/4"-thick x 1"-wide strips, then mitre their ends. Sand their faces and ease their edge before installing them. A small bead of glue on the door panel, coupled with my trusty pin nailer, and the trim strips are in place for good. I used a bit of wood filler to fill any tiny holes left by the nailer.

Rout Hinge Mortises – A trim router, equipped with a straight bit, makes quick work of the mortises for hinges. Before making the series of passes to remove the waste, use a wide chisel or plane iron to score a straight line at either end of the mortise.

Crosscut the Door – Once the doors have been temporarily installed, then marked and removed, a track saw makes accurate and quick work of cutting the bottom and top edges of each door.

Simple Stop – Brown made a solid wood stop, and embedded a rare earth magnet in it, in order to keep the door in place when closed. A purchased piece of hardware could also be used here.

Mortise for the hinges

I cut the doors slightly oversize, then marked for the hinges. I first scored the edges of the mortises to avoid splintering, then used a trim router with a straight bit to recess the hinge flush with the door edge. For now, only predrill and install a couple of screws in each hinge, in case you need to adjust the hinge location on the door.

Time to fit the doors

I found it easiest to have a few thin spacers that would lift the door to the right height. I aligned the doors so there was a 1/8" gap above them, and the faces of the doors were set back about 1/8" from the face of the trim, then marked where one screw should be installed in each hinge. At this point, an extra set of hands is nice to have, but not necessary. These dimensions worked nicely for my situation, but for yours it will depend on whether the doors are built for a new or existing space, and what sort of details you're dealing with.

With the doors temporarily hung, I took a close look at their operation and how they looked. A few changes were needed, both to the overall dimensions of the doors, as well as how they were

Easy Crosscuts

When working with large workpieces, it can be a challenge to make accurate crosscuts. If you don't have a track saw, an adjustable edge guide like the Bora 50" WTX Clamp Edge Saw Guide from Affinity Tool Works is a great tool to have. Easily and quickly clamp the guide to the workpiece at any angle necessary, then use your circular saw, router or other power tool to make an accurate cut. Learn more at AffinityTool.com. Similar models from Lee Valley, Home Hardware, Brettwood Machinery, Grizzly, Kreg and Workshop Supply are also available.

hung. I had to cut a fair bit of material off their bottoms to allow them to swing freely, and so they would align with each other. I also needed to move the bottom of one door inward so the two doors would meet evenly down their center line. A couple of trips to and from my shop, with doors in hand, and I had a fit I was happy with. I also beveled the inner edges of each door at about 3°, so they wouldn't bind when opened.

Finishing them off

I then brought the doors back to my shop, where I made sure all the faces were sanded smooth, and edges eased, before priming and painting them.

I installed a simple handle in each door, then made and installed a wood stop with magnetic catch that would hold the doors in place when closed. I used a pair of rare earth magnets set into a piece of wood. The wood acted as a stop, and the magnets attracted a cup washer installed into the upper front corner of each door. After a few uses, I found the sound of magnet on metal a little much, so I added a very thin felt bumper between the wood stop and the backs of the doors.

After realizing how simple and fun these doors were to make, I realized I shouldn't have procrastinated on making them since we moved in 12 years ago.

ROB BROWN
rbrown@canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Interior Door Installation *(Feb/Mar 2012)*, Make a Sliding Door *(Aug/Sept 2013)*

INFO: DIFFICULTY – **2/5,** LENGTH/TIME – **2/5,** COST – **1/5**
SPECIAL TOOLS – **MISCELLANEOUS TEXTURING TOOLS**

Make a Simple TEXTURED BOX

These boxes are so easy and fun to make, you won't know when to stop. Grab a few small pieces of wood and see where this basic starting point takes you.

BY ROB BROWN

Once I got the general approach of how I was going to build these boxes down, I could knock them off pretty quickly. An assortment of different coloured wood species, heights and widths makes for a pretty interesting collection of boxes. Even as simple art items, these boxes would look great on a shelf, with a spotlight to highlight their texture.

Design considerations

The overall dimensions and details of these boxes are very flexible. I made boxes between 2-1/2" and 5" high, and between 1" and 2" square, but you can really go as big, or as small, as you'd like. Generally speaking, drill a hole about 3/8" narrower than the width of your box, so the walls will still be strong enough to withstand handling. It's also unlikely the holes you drill will be perfectly centered – I know mine weren't.

I used a thin vein line to conceal the joint between the lid and box. I only added texture above the top vein line, and below the lower vein line, but there's no rule against adding texture to the entire box. There's also nothing wrong with skipping the texture altogether. Chip carving or inlay would also be a great way to adorn the faces of these boxes.

Break out a blank

Rip some stock square, and to the final width of your box. It's best to start with a piece of wood that's longer than the final length of the box you want. You can make multiple boxes out of one long length of wood. Trim one end of the stock square; this will be the finished top surface of the box. Finish sand the four faces and top of the work piece and make sure the four edges are eased so they're comfortable on the hands. It's strange to finish-sand this early in the project, but if you're adding texture to your box, sanding will only remove any crisp edges left by the texturing tools.

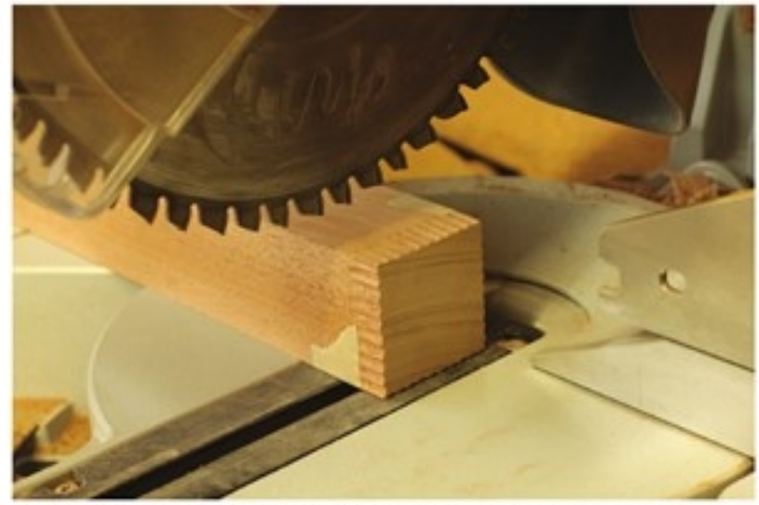
Add texture

If adding texture to wood is new to you I would strongly suggest practising on some scrap beforehand. Layout the vein lines near the top of the box, then use a sharp gouge to add rounded grooves from just above the vein line towards the top end of the box on all four sides. Use a V-gouge to add the vein line on all four sides of the box, making sure not to cause any chipping near the edges. Neither the texture, nor the vein line, have to be perfect. Slight imperfections are what give texture a lot of its character.

Chop its head off

I applied masking tape to the underside and back faces of the box when cutting on my mitre saw, so when I cut the box lid off there was less splintering. I made my lids about 1/2" long, but this is more art than science. Just don't cut the lid too short to make it weak. While at the mitre saw, cut the bottom end of the box to determine how long the finished box will be. Mark an "X" centered on the top end of the main body of the box so you'll know which end to bore the hole in. Also, mark a "G", for "glue", on the underside of the top, as you'll eventually glue the lid lip to the underside of the main lid. You'll want to ensure the grain in the body and lid line up when it's assembled.

Add Texture – Once the blank has been cut to finished width in both directions, and the top surface has been squared off, Brown adds texture to the sides. For now texture is only added to the top of the box.



Cut the Lid Off – Because the four sides are finish sanded, Brown adds masking tape where the cut will exit the workpiece. This helps prevent splinters from forming.

Drill the hole

It's crucial to clamp something to the body of the box while drilling the cavity, as otherwise the drill press will grab the box and injure your hand. I placed the main body of the box on a flat surface, lined up two flat cauls on either side of it, then clamped the cauls to either side of the box. I was then able to hold the clamp and cauls to give me a better grasp of the work piece. The added benefit was the cauls, being perfectly flush with the underside of the box, helped keep the box flat on my drill press's table while the cavity was being bored.

Mark the Center Point – With a steel rule you can line it up with opposing corners and mark an X in the center of the box blank.

I set up my drill press table's height so the bit barely cleared the top of the body of the box. I also made sure the bit wouldn't drill clear through the bottom of the box at the lower end of the stroke. With the drill press on make repeated bores into the center of the box, until the hole is at the correct depth. I had to stop my drill press many times to allow the drill bit to cool – a small container of water sped the process up. Don't overheat the drill bit or you will ruin it. I used spade and Forstner bits in different boxes, and both work fine.

Add more texture

Clamp the box in a vise and add more texture, as well as a vein line, to the bottom area of the box sides. I positioned the upper and lower vein lines the same distance from the ends of the finished box, but another option is to position the lower vein line slightly further from the bottom of the box, as giving added visual weight to the base of the box gives a sense of grounding.

Drill it Out – A clamp and cauls make holding the main section of the box in place much easier and safer.

Second Vein Line – Around the bottom of the box another vein line needs to be added, after adding matching texture to the area.

Slide of Endgrain – After cutting a thin slice of endgrain wood, mark a circle on it and use a chisel to remove most of the waste.

Careful Shaping – Fine tune the shape of the disk so it fits the opening of the box perfectly. A belt sander, turned on edge, works quickly, but a sanding block is less likely to remove too much material.

Lid lip

This is possibly the trickiest detail in making this box, so doing it right ensures the box looks and functions nicely. The lid lip gets glued to the underside of the lid, and not only centers the lid, but keeps it in place. Your cavity may, or may not, be perfectly round or centered, so keep that in mind. Cut an end grain slice of wood about 1/8" long, and wider than your cavity. Draw the shape of the cavity on this slice then remove much of the waste with a sharp chisel and mallet. A belt sander, tilted on edge, will quickly (sometimes too quickly) remove waste to the line. At this point it's a series of tests and sandings until the lid lip fits in the cavity nicely. Try not to lose the lid lip into the cavity, as it's not easy to extract. You don't want it too loose or it won't hold the lid in place accurately. When doing this process ensure the grain direction of the lid lip is aligned with the grain direction of the lid and main body, so they will move with the seasons and cause no problems down the road. Mark the face that will be glued, so there are no mistakes during glue-up.

Glue the lid lip

Gluing the lid lip to the lid is easy, as long as you have the process right. Cut a piece of scrap to fit into the cavity, so its upper end is slightly further than 1/8" (or the thickness of the lid lip) below the upper end of the main body of the box. Fold up a piece of paper towel so it's a good 1/16" thick and will fit into the cavity, on

Applying Pressure – Brown inserts a piece of carefully measured scrap inside the box, then adds a piece of folded paper towel and the circular lid lip, followed by the top of the box. The folded paper towel applies pressure to force the lid lip against the top of the box during assembly.

Domestic or Exotic Wood?

There are a few different directions you can take when selecting material for these boxes. Selecting simple, straight-grained material will allow any texture you add to the boxes to be the focal point. On the other hand, if exotic or highly figured wood is what you want to work with, you may find reducing the texture the best approach. And with these small boxes the amount of wood you need is minimal, so the total cost of purchasing exotic wood will not be too high. A few of the many options for sourcing woods of all types are Exotic Woods, in Burlington, ON, Century Mill, in Stouffville ON, B.C.W. in Brantford, ON, Woodchuckers, in Toronto, ON, The Wood Shed, in Smithville, ON and A&M Wood Specialty, in Cambridge, ON.

Glue Sizing – In order for the glue to not stain the underside of the lid lip Brown adds an even layer of glue to the lid lip, then lets it dry for a few minutes, before adding a bit more glue and bringing the parts together.

top of the piece of scrap. When the lid lip is placed in the cavity, and the lid of the box is positioned on top of the lid lip, light clamp pressure will compress the parts until the glue dries.

To ensure the main lid is aligned perfectly over the main body of the box during assembly, use a flat caul on each side of the box. Lightly clamp these cauls to the sides of the main body of the box and the lid will slide down between the cauls during assembly.

The last detail to consider is glue sizing. Because the end grain of the lid will allow glue to soak up inside it, there's a chance that glue could squeeze out the top surface, causing ugly stains. It's also going to produce a stronger joint if the top of the lid lip and the center area of the underside of the lid have been very lightly coated with glue a few minutes before final assembly. During assembly the parts can be re-glued and brought together for good. When dry, ease the edges between the lid and the box.

Add a finish

Spraying a finish onto a textured surface works great. A spray bomb may be your best friend when it comes to finishing these boxes, unless you have spray equipment. You can also wipe or brush it on; with small projects like this it's not going to be too much more difficult. I applied three coats of spray-on polyurethane to the sides of the box, but between the coats I added an extra couple of light coats to the end grain on the top and bottom of the box, as it soaks in finish material quickly.

Lots of Cauls – Cauls on all four sides of the box during assembly ensure the lid is aligned with the body of the box perfectly. Just make sure the cauls are perfectly smooth, or impressions will be transferred to the box.

It's important these boxes feel nice in the hand, as they will be touched a lot. Texture has a way of tricking people into reaching for it. Once the finish is fully dry, I used #0000 steel wool and wax to buff the surfaces smooth. I stayed away from the textured surfaces, as those can't be improved. I applied a few light coats of shellac to the inside of the box. I didn't use an oil-based finish, as it needs air circulation to function properly.

ROB BROWN
rbrown@canadianwoodworking.com

Rob turned this "weekend" project into a "two-weekend" affair once he realized how easy and fun these boxes were to make. He's also never had his Christmas gift-making done this early.

Go Online for More

RELATED ARTICLES: **Making Turned Boxes *(OctNov 2014)*, Make a Lily Pad Box *(DecJan 2015)***
VIDEOS: **Watch a video titled "6 Tips for Adding Texture to Wood" in the Videos section of our website.**

"SUPERB PERFORMANCE FROM A FULL-FEATURED DUST COLLECTOR BUILT TO LAST A LIFETIME"

- CANADIAN WOODWORKING

VISIT
LAGUNATOOLS.CA
TO READ THE COMPLETE REVIEW

- **HEPA**
- **EZ LIFT DRUM**
- **SMART SENSORS**
- **NOISE REDUCING FOAM**

PRODUCT SHOWN:

P|FLUX:E

G2C

GENERATION TWO CYCLONE

CATALOG DOWNLOAD

LAGUNA AIR

THE DUST HAS SETTLED

LAGUNACLEANAIR.COM

FIND A LOCAL DEALER AT
LAGUNATOOLS.CA

Thinning Finishes

Let's clear up some of the issues around thinning common wood finishes.

BY CARL DUGUAY

Depending on the type of finish you use, how you apply the finish (brush, rag or spray) and the heat and humidity levels in your shop, you may find it helpful to thin the finish to make it easier to apply and keep it from drying out too quickly.

Oil finishes (principally tung and linseed), oil/varnish blends (any product that contains a petroleum distillate such as mineral spirits), and the new crop of hardwax oils typically don't need any thinning. They're meant to be applied in thin coats, by rag or brush. Water-based finishes are thinned with water or a commercial retarder like General Finishes Extender, which contains propylene glycol (a nontoxic compound used in the food processing industry). All these finishes have the advantage of having low VOC (volatile organic compound) levels or none at all.

However, for the more 'traditional' finishes – oil-based varnish and polyurethane, lacquer and shellac – the thinners are both toxic and highly flammable. They affect us through the fumes we breathe in, and from contact with our skin. It's not just the short-term effects that we ought to be concerned with but also the cumulative, long-term impacts. This is especially important for those of us who work in confined spaces where vapours can't easily escape.

Regardless of what you may have heard about these compounds, it makes sense to always wear an appropriate respirator, eye protection and gloves, even when using small amounts. Additionally, all these products should be considered flammable. Clean your brushes and spray equipment after use, and spread any rags in a single layer so that heat dissipates while the rags dry, after which you can safely discard them. And remember, don't flush chemicals down the drain (or dispose them in your back yard). Take them to your local recycle centre.

While there are dozens of chemical compounds on the market, we've listed the ones that woodworkers are most likely to use for thinning finishes (or dissolving, in the case of shellac flakes). There

Photos by Carl Duguay

The Well-Protected Woodworker

We recommend that you invest in a half- or full-mask respirator (such as the 3M 7500) that is equipped with an organic vapour cartridge (such as the 3M 6001). Protect your eyes with chemical splash goggles or safety glasses, and your hands with nitrile or neoprene gloves. The latter products are available from Lee Valley.

are two major manufacturers of these products – Recochem is the major producer in Canada, and their solvents and thinners are available through most building supply stores. They also manufacture other brands of solvents and thinners under license. Less commonly available are products from the US-based Klean-Strip.

Thinning oil-based varnish and polyurethane

The thinner to use for oil-based varnish and polyurethane is mineral spirits – 3 or 4 parts varnish to 1 part mineral spirits. The ratio isn't crucial. If you prefer to apply these finishes with a rag, thin them with about 50% mineral spirits, essentially creating your own 'wiping varnish'. Of course, the more you dilute the finish, the more coats you'll need to apply to build it up, as you're putting less finish on the wood during each application. Lay on an extra couple of coats if you're using a thinned brush-on finish, and upwards of a dozen or more coats if you're using a wiping varnish. Use mineral spirits to clean your brushes and as a degreaser for cleaning the oil that typically covers new machinery. It's also available in a low-odour formula – the aromatic solvents are removed, which gives it a somewhat slower evaporation rate.

Because mineral spirits is so commonly used there is a risk of becoming complacent (especially when using the low-odour formula). While it is somewhat safer than other chemicals, the fumes are still toxic, it can cause skin irritations, repeated exposure can cause damage to your nervous system, and it's flammable.

While mineral spirits is a bit more expensive, the only reason to use any of these alternative thinners would be if you can't get access to mineral spirits.

Paint thinner is essentially the same product as mineral spirits, but with a lower level of purity.

Varsol, a trademark name of Imperial Oil, is mineral spirits.

Naphtha (Camping Fuel) is more volatile than mineral spirits so it shortens the drying time. It's also more flammable.

Turpentine was the traditional thinner for varnish, but it dries slowly, has a pungent odour and is more expensive.

Mineral Spirits – Though products like paint thinner, Varsol and Naptha are similar to mineral spirits, they are not as pure. For best results use mineral spirits whenever you can. (Photo by Recochem)

Dissolving and thinning shellac

Shellac flakes are dissolved with alcohol. You also thin liquid shellac with alcohol. The exact ratio of alcohol to flakes (referred to as the pound-cut) isn't critical. The preferred alcohol to use is ethyl alcohol (ethanol), the same stuff booze is made from. It's widely available in the USA as Denatured Alcohol (additives

make it unfit to drink), but difficult to obtain in Canada. However, some Ace-affiliated hardware stores do carry the Klean-Strip brand. Another option is Recochem's BioFlame fuel, which is 93% ethanol/propanol.

More widely available is isopropyl, which is widely available as rubbing alcohol in pharmacies and grocery stores. Choose the 99% solution, which has less water than the 70% solution. I find that isopropyl takes noticeably longer to dissolve shellac than ethanol.

Methanol (methyl hydrate, wood alcohol) is best avoided, as it's highly toxic and more flammable than ethanol or isopropyl.

Thinning Shellac – Great for thinning any shellac product, this product is also compatible with some lacquers. (Photo by Lee Valley Tools)

Thinning lacquer

Lacquer thinner is the thinner for any type of lacquer, whether for a nitrocellulose brushing lacquer, or a nitrocellulose, CAB-acrylic, or catalyzed spray lacquer. You also use it for cleaning your brushes and spray equipment. It's a more complex product, as it's made up of a variety of solvents and alcohols, such as acetone, toulene, xylene, ethanol and methanol. For spray lacquer it's best to use the specific lacquer thinner recommend by the manufacturer of the lacquer you're using, as those will have been tested for compatibility. For a brushing lacquer you can use a lacquer thinner available at your local paint outlet.

Manufacturers:
Recochem.com
KleanStrip.com
OrangeApeel.ca

Sources:
CanadianTire.ca
HomeHardware.com
LeeValley.com

What's in a Name

As the name implies, a 'thinner' is used to thin (reduce the viscosity) of a finish. A 'solvent,' on the other hand, breaks down (dissolves) a substance. However, some thinners can also act as solvents, and some solvents are used for thinning. For example, mineral spirits is a thinner for varnish, but it will also dissolve wax. Denatured alcohol is a solvent for shellac flakes, but is also a thinner for shellac and lacquer.

CARL DUGUAY
cduguay@canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Introduction to Wood Finishing *(Dec/Jan 2017)*, Sandpaper *(Feb/Mar 2017)*

RIDGID

INDUSTRY'S FIRST
18V HYBRID FORCED AIR PROPANE HEATER

Fan Runs Off An Extension Cord Or An 18V Battery For Up To 7 Hours

RIDGID LIFETIME SERVICE AGREEMENT REGISTRATION REQUIRED

FREE BATTERIES
FREE PARTS
FREE SERVICE FOR LIFE

NEW

18V BRUSHLESS HYBRID FORCED AIR PROPANE HEATER R860424B

60,000 BTU Output — Heats up to 1,350 sq.ft.

100% COMPATIBLE

All RIDGID® 18V Tools
Work with All RIDGID® 18V Batteries

exclusive

THE HOME DEPOT
More saving. More doing.

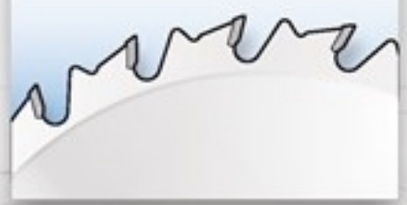
* Sold at Home Depot Canada as tool only, battery & charger sold separately.

Saw Blades

BLADE

Rip

- Usually FTG teeth
- 20 - 30 teeth per blade
- Has deep gullets
- For cutting with the grain
- Cuts like a chisel giving flat bottomed grooves



Cross Cut

- Usually ATB teeth
- 60 - 80 teeth per blade
- For cutting across the grain
- Slices like a knife
- Cuts 'V' bottom grooves

Combination
(General Purpose)

- Usually ATB+R teeth
- 40 – 50 teeth per blade
- Usually has 1 deep gullet, followed by 4 small gullets
- Compromise for ripping and crosscutting
- Cuts nearly flat bottomed grooves

Finish

- Usually Hi-ATB teeth
- 60 - 90 teeth per blade
- Low hook angles reduce tear-out
- For ripping and crosscutting
- Excellent for sheet goods, veneer

TOOTH STY

FTG
(Flat Top Grind)

- Teeth ground flat across the top
- Not as clean cutting as ATB
- Easy to resharpen

ATB
(Alternate Top Bevel)

- Teeth beveled right to left from 10° to 20°
- Low tear-out
- Easier to chip teeth than FTG

HI-ATB
(High Alternate Top Bevel)

- An ATB with top bevel angles of 30° to 40°
- Delivers the cleanest cuts

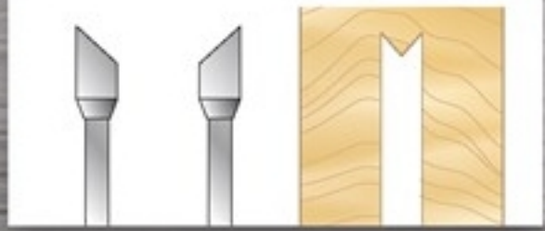
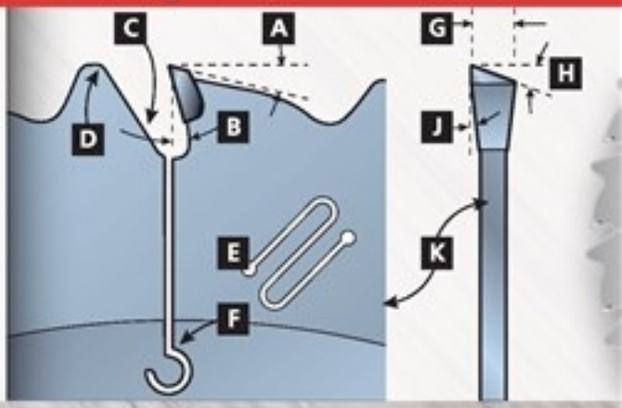


Plate Anatomy / Tooth Geometry

- Typically high speed steel
- Laser cut (better) or stamped
- Hand (better) or machine tensioned
- Sometimes coated

- **Top clearance angles commonly 15°**
- **Hook angles from -5° to 20°**
- **Higher hook angles cut more aggressively, quickly**
- **Radial clearance angle reduce heat build-up**



From the editors of

Canadian Woodworking & Home Improvement

TYPES

Plywood/Veneer

- FTG or TCG teeth
- 80 – 180 teeth per blade
- Plate generally stamped
- Often thin kerf
- For both table and circular/ track saws

Nail Cutting

- Usually FTG teeth
- 15 - 18 teeth per blade
- Ribbing or vents reduce heat build-up
- Usually thin kerf
- Used with circular saws

Mitre

- ATB or TCG teeth with low or negative rake angle
- 60 - 90 teeth per blade
- For cutting across the grain
- Often thin kerf

Dado

- Two ATB blades with one or more FTG chippers.
- 20-50 teeth on ATB blades, 2-4 teeth on chippers
- Cuts flat bottomed dados
- Generally in 6" or 8" sizes

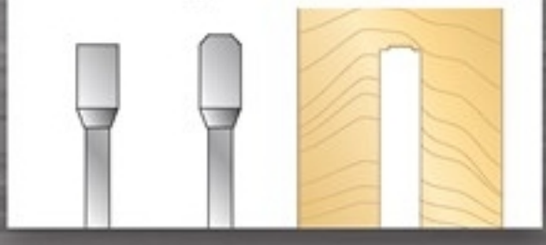
TYPES

ATB+R (Alternate Top Bevel plus Raker)

- Usually 4 ATB or Hi-ATB teeth with 5th tooth FTG
- Best for brittle material
- Decent option for cutting wood in all directions

TCG (Triple Chip Grind)

- Flat-ground tooth placed between two teeth with beveled edges
- Blades run cooler
- Best for sheet goods and plastic laminates

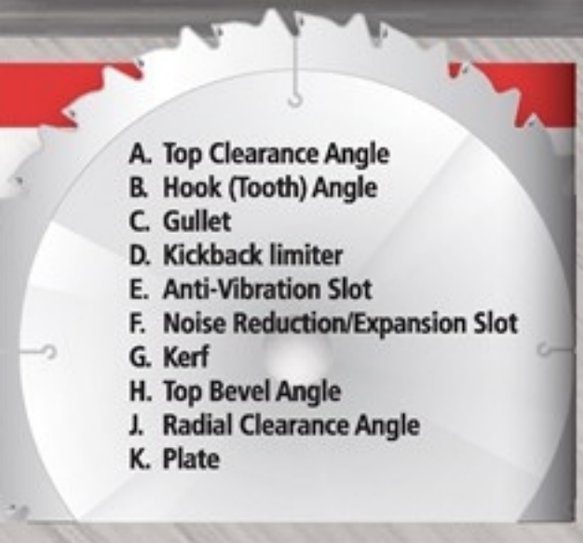


BLADE SIZES

Table Saw:
10" To 12"

Mitre Saw:
7-1/4" To 12"

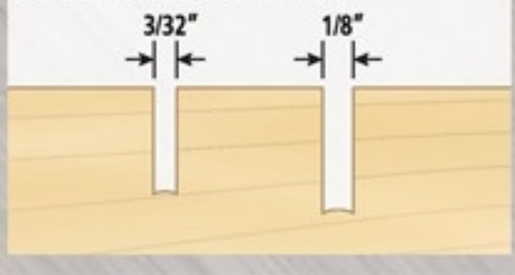
Circular/Track Saw:
6-1/4" To 10-1/4"



A. Top Clearance Angle
B. Hook (Tooth) Angle
C. Gullet
D. Kickback limiter
E. Anti-Vibration Slot
F. Noise Reduction/Expansion Slot
G. Kerf
H. Top Bevel Angle
J. Radial Clearance Angle
K. Plate

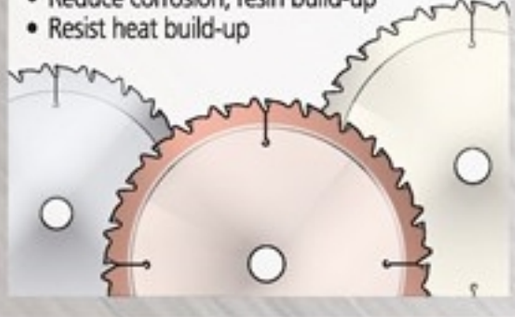
Thin Kerf

- Kerf is 3/32" wide vs 1/8" for full kerf blade
- Removes less material
- Produces less sawdust
- Puts less strain on saw motor



Coatings

- Decrease friction
- Improve wear resistance
- Reduce corrosion, resin build-up
- Resist heat build-up



Portable TABLE SAWS Under $500

Some small shops are so tight on space that a permanently set-up table saw isn't an option. Portable table saws are often the tool of choice for contractors, but there's nothing saying small shop enthusiasts can't use them to their advantage to help in a tight situation.

Photos by Rich Keller, Product Photos by Manufacturer Lead photo by Ridgid

BY RICH KELLER

The table saw is probably the most used piece of equipment in many shops. It can perform a wide variety of tasks with ease, so it's no wonder table saws are so commonplace. There is a wide range of smaller table saws on the market today, and most manufacturers have vastly improved their portable table saw offerings in the last decade. Today's models are lighter, more robust and better featured than ever.

Start with safety

One thing that stood out to me with all the table saws that I looked at was the blade guards. It used to be when you bought a table saw, the first thing you would do is throw away the guard, as they were more of a hazard than a safety device. Not so any more. Due to changes in C.S.A. requirements in 2010, manufacturers were required to provide riving knives and functional guards on all new saws sold. Guards and kickback fingers must be removable and replaceable on the riving knife within 30 seconds without tools. All the saws I looked at have excellent guards. Another feature that all these saws shared was good dust collection. All of the blades were well shrouded underneath the table with a convenient vacuum port on the back of the saw. This ensures an attached vacuum is capturing maximum dust.

One area where some improvement is needed for all the saws I looked at is with the rip fences. All of the fences had some sort of quirk that I didn't like. Manufacturers seemed to either make their fence accurate but not user friendly, or vice-versa. A few were downright complicated.

All the saws I tested used 15-amp universal type motors. This is the same type of motor that your mitre saw or other hand-held power tools use. These motors have lots of torque, and will provide the saw the maximum amount of power that can be obtained from a standard household outlet. It is important to remember that these saws don't have unlimited power, though. All the saws that I tested came with a blade, even if it was poor. Having a good blade will reduce the amount of power the motor needs to make a cut. Using a thin kerf blade on these saws is also a good approach.

The saws

Bosch GTS1031

$499

50 lb

I liked a number of things about the Bosch GTS1031. There's onboard storage for all the extra parts, and the fence locked securely. Bosch makes an optional accessory stand for the saw, which is easy to use and folds flat when not in use. This makes the saw highly portable. The fence was a little confusing to use with the built-in tape measure. There are two scales printed on the tape – one for use with the right table extension folded in, and one for use when the table extension is extended. Also, when the table extension is folded in, you read the setting from the cursor on the fence, but when you put the table extension out you have to read the setting from another cursor positioned in front of the blade. The fence needs to be locked in the right position on the extension for the tape to read correctly. A number of the saws used this system for their fences. Bosch did at least print instructions on the fence rail; not all the manufacturers that used this system did this.

Different Scales – Bosch prints instructions on the front fence rail as a convenient reminder how to read the built in scale.

King KC-5100C

$349

66 lb (including stand)

King of Storage – The King table saw has dedicated storage for all the accessories.

The King KC-5100C had some excellent features. I liked the large size tabletop. I also liked that the wheel stand was included with the King saw. The assembly was a bit time consuming, as there were a lot of parts for the stand, but otherwise the saw was fully assembled. I liked that there was onboard storage for all the saw parts, and space for a spare blade. The saw also had a great fine adjust wheel for the tilt. A dado insert plate is also included. The fence on the King saw locked securely and was fairly easy to use.

One quirk with the fence is that when you extend the fence rails to the right, you have to add the measurement shown on the fence cursor to a second measurement shown on a pointer in front of the blade. You can't directly read a dimension over 14", even though the saw can cut up to 26".

Tucked Away – The fence on the Skil table saw fits under the top for storage and transportation.

Skil SPT70WT-22

$499

46 lb

The unique feature of the Skil SPT70WT-22 saw is its worm drive motor. Skil uses a right angle drive similar to their legendary handheld saws to give this table saw lots of torque. Because of the worm drive motor, this saw is also able to get slightly more blade height (3-1/2", as opposed to 3-1/4"), allowing it to cut through a 4 x 4 fence post in one pass. The Skil saw also comes with a 30-tooth Freud ripping blade. This was the only saw I tested that came with what I would consider a premium blade. I cut 3/4" cherry with the Skil saw and found it had lots of power. This saw had many nice features including on-board storage for all accessories and an optional folding stand. The fence was virtually identical to the Bosch; however, the Skil fence didn't slide as easily.

DeWalt DWE7480

$399

45 lb

The DeWalt DWE7480 featured a different fence system than all the other saws I looked at. The fence locks onto the rails in one of two possible positions, depending on the width of rip you're cutting. The fence rails are then moved left and right with a handy knob on the saw. The system allows the fence to stay parallel to the blade, and it's also a lot simpler to figure out which of the two different measurement scales to use. I also liked how the fence locked onto the rails. It seemed like a more secure system than others, and because there are alignment pins on the front and back rail, it

Nice, Simple Fence – The fence on the DeWalt saw has a handy adjustment knob and locking lever under the table.

seems unlikely that the fence would get out of true. The DeWalt saw also packs into a very compact cube with all the accessories hidden away onboard, making it good for storage or travel.

Ridgid R4513

$499

78.5 lb (including stand)

The Ridgid saw showed a lot of promise as I unpacked it. Everything was simple, sturdy and well thought out. Like most of the other saws, there were onboard storage places provided for all the accessories and a spare blade. The stand was similar to the King, but I found the locking/release lever on the Ridgid a little better positioned and easier to operate. I also liked that there was a fine adjust knob on the tilt setting for the blade. The biggest thing I noticed was the fence.

Easy to Read – The scale for the fence on the Ridgid saw is simple and helpful; it's direct reading in all positions.

The fence has one scale, and the setting is directly read in any position – very well thought out. However, once I started playing with the saw I discovered the fence would slide out of position with minimal pressure when locked in place. I adjusted the locking mechanism a bit (there is a C-bracket under the front of the table that controls the tension) and was able to tighten up the fence a bit, but I still was able to move the fence without excessive pressure.

Nice and Simple – The Ryobi saw doesn't have any bells and whistles, but it's a solid performer at a very reasonable price.

A Helping Hand – A sliding rail can be extended out the back of the MasterCraft saw, offering support to longer material.

Ryobi RTS10G

$169

48 lb (including stand)

The Ryobi table saw was the most economical saw I tested. It's compact and simple, and does not have all the bells and whistles that the other saws have, but depending on your needs, it may be suitable. While it doesn't have a fold-up stand or big table top, it has a powerful 15-amp motor like the other saws. The Ryobi saw comes with a four-leg stand, that must be assembled. The saw could also be used on a bench top or cart. The stand doesn't fold up, but even with the saw bolted to the stand, the package isn't so heavy you can't move it around. The Ryobi only has 12" of rip capacity, but for smaller projects this may be fine. The saw doesn't have standard 3/8" x 3/4" mitre slots, so you probably won't be able to use many after-market jigs with this saw.

MasterCraft 055-6766-2

$449

55 lb

The MasterCraft saw was the quietest saw of all that I tested, at 83 dB. It also has a soft start, which is a nice feature. It shares many of the common features with the other saws, such as on-board storage for all the extra parts, and extendable fence/table on the right side of the saw. The MasterCraft saw also comes with a 12"-deep rear outfeed support system, which none of the other saws included. This outfeed support is very helpful for cutting longer stock.

shopnews

Sponsored Content

Toronto-Based Woodworking School

If you're looking to learn woodworking skills and techniques, take a look at In The Grain Workshop. The Toronto-based fine woodworking school offers both full and part time courses. Their Hobbyist section allows you to buy hours and use them against set projects or one of your own design. Available courses include tool making, boxes, tables and lamps. Instructors teach a hybrid style of woodworking where some initial work is done with power tools and then refined with time tested hand tool skills. Visit their website **www.inthegrain.ca**

Model	Max Rip	Usable Table Size	dB	Dado Capable?	Accessories?	Weight
Ridgid R4513 $499	25-1/2"	39" x 20-3/4"	89	Yes	Includes wheel stand	78.5 lb including stand
Ryobi RTS10G $169	12"	23" x 17"	90.5	No	Includes 4 leg stand, not collapsible.	48 lb including stand
MasterCraft 055-6766-2 $449	24-1/2"	37" x 21"	83* Soft Start	No	Includes outfeed support	55 lb
Bosch GTS1031 $499	18"	30-1/2" x 20"	91	No	Optional stand available	50 lb
King KC-5100C $349	26"	39" x 21"	94	Yes dado insert included	Wheel stand included	66 lb including stand
Skil SPT70WT-22 $499	25"	34-1/2" x 20"	90.5	No	Optional stand available	46 lb
DeWalt DWE7480 $399	24-1/4"	35" x 19"	94	No	Optional stand available	45 lb

Conclusions

The saws I looked at for this article fell into one of two size categories. The Bosch, Skil, DeWalt, and Ryobi all are what I would call benchtop/small portable saws. The King, Ridgid, and MasterCraft saws are what I would call large portables. All of these saws were portable, but some are designed for easy portability, and some more for certain features. For example, only the Ridgid and King table saws had the ability to take a dado blade. These saws were also the largest ones I tested, both in weight and physical size. The Bosch, Skil, DeWalt and Ryobi saws all had smaller tabletops, but were up to 30 lb lighter than the large portables. Choosing the best table saw for under $500 was a difficult task because there were two different styles of saws to choose from, really geared to two different sets of needs.

In order to pick the "Best Hobbyist" saw, I tried to picture what features would be the most important to the home hobbyist. I think versatility and reliability are important, so the saw needs to have maximum capability and be solidly built. It still needs to store compactly and be easy to move around, as space in the hobby shop is usually limited. It also needs to be easy on the wallet. For this reason I picked the King KC-5100C. While it's a bit heavier, the hobbyist isn't likely to be lugging it up a flight of stairs or putting it into the back of a truck. I think the hobbyist is more likely to have the saw in the garage, and maybe roll it out into the driveway or yard on occasion. It comes with a wheel stand, so moving it around in the shop is easy enough. It also has a dado arbour and comes with the needed table insert, giving lots of versatility. The fence locks solid, and other than the math required with the scale, I have no complaints about this saw.

For the "Best Professional" saw, I tried to think of what would be most important to a contractor. First is weight. If you're going to be taking this saw in and out of a truck all the time, you don't want it to weigh a ton. It needs to be compact so it doesn't tie up too much space in a truck. It needs to be easy to use, accurate and rugged. For these reasons I picked the DeWalt saw. It packs small but can perform big. There is an optional stand available for it, so you don't have to work on the ground. It has 24-1/4" rip capacity so you can rip a sheet of plywood in half. The DeWalt was also the lightest of all the saws I tested at 45 lb. For these reasons I think the DeWalt saw would make an excellent addition to a contractor's tool kit.

RICH KELLER
rich.keller@hotmail.com

Go Online for More

RELATED ARTICLES: **Contractor Style Table Saws** ***(Dec/Jan 2006)***

RIKON

Need To Drill Square Holes?

X-Y Mortising Machine **34-260** gives precision positioning of your work for boring mortises because of the sliding, X-Y axis table. Front controls move the table either forward-and-back, or side-to-side along the dual dovetail ways.

Features:

- Powerful 1/2 HP motor will handle cutting the hardest wood
- Dovetail column ways give smooth vertical travel for boring
- Piston-assist feed return regulates plunge and release speed for safety
- Long, multi-position handle gives great leverage for advancing the chisels


Adjustable Table Clamp


Left to Right Sliding Table


Keeps All Your Tools In One Convenient Location


Accepts 5/8" or 3/4" Shank Chisels

Call today for more information **877-884-5167**
or visit **www.rikontools.com** for a dealer near you!

5 YEAR WARRANTY

Tankless Water Heaters

On-demand hot water systems save space, save energy, and save you money.

Photos by Steibel Eltron

BY CARL DUGUAY

The conventional tank water heater has been around for well over 100 years, and while the technology has changed, it still functions pretty well the same. Water enters a holding tank, where it's heated to about 120° and maintained at that temperature until you use it. At about 20 percent of a typical household energy bill, that eats up a lot of your hard-earned cash.

Not so with tankless (on-demand) hot water heaters. They don't store any water and only heat up the water when a hot water tap is turned on. Tankless water heaters have been popular in Europe, where the cost of electricity is more expensive than in Canada.

The tankless market is maturing in Canada, with a lot more products on offer that provide better circuitry and are more efficient than earlier models. And, the purchase costs are coming down.

How they work

There are electric and gas (natural gas or propane) models to choose from, for either whole-house supply, or point-of-use supply. Both work essentially the same way. When you open a hot water tap, water begins to flow through one or more heating modules located in the heater. A flow sensor sends an activation signal to a control unit that powers up an electric element or gas/propane burner. The water is heated as it flows through the tubing in the heating modules. When the tap is turned off, the heater automatically shuts off.

Gas models can be non-condensing (the hot exhaust is vented directly outside the home) or condensing (the hot exhaust is reused to further heat the water before being vented). While tankless heaters can be installed outside, doing away with the need for venting, this is impractical for most areas of Canada because of below freezing winter temperatures.

Condensing gas models are the most efficient, though both gas models have a higher efficiency rating than electric models. However, they do require annual maintenance – electric models do not. With either electric or gas heaters, you may experience a short, 10-second or so, delay for the hot water to reach the tap after you turn it on. Installing a small holding tank in-line with the tankless heater can help resolve this issue.

Factors that affect performance

There are three factors that affect the performance of a tankless heater: the temperature of the water coming into your house – the groundwater temperature; the temperature that you want the water to be when it exits the tap – the output temperature; and the volume of hot water that you want, measured in GPM (gallons per minute) – the flow rate.

The flow rate is determined by adding up the GPM required to run, simultaneously, all the appliances that use hot water. For example, if you run the dishwasher (average GPM of 1.5) at the same time as you take a shower (average GPM of 2.5), then the flow rate you need is 4.0 GPM. The tankless heater you choose must be able to heat up and deliver at least 4.0 gallons of hot water per minute.

To do this, the heater has to raise the temperature of the incoming water to your desired output temperature. Say you like to shower in 120-degree water. During the summer, the incoming water might be around 75°. The tankless heater needs to increase the water temperature by 45°. However, in the winter, when the incoming water drops to perhaps 40°, then it would need to raise the water temperature by 80°. To get the hot water you need throughout the winter, you'll need a heater that produces a temperature rise of 80°.

A Look Inside – The cold water intake is at the lower right. Water moves past a small flow sensor before moving into the heating modules, getting heated and travelling out the hot water outlet on the lower left. The controller is the black box in the right of the photo. All tankless heaters are different, but these general steps are typical.

The Finished Look – The same unit shown with the front cover in place.

Some Points to Consider

- Can be installed almost anywhere.
- Mounts easily on a wall.
- Only heats the water you use.
- More economical to operate than a tank system.
- Double the life expectancy of a tank system.
- Higher installation cost.
- May require upgrading electrical service panel or gas meter/piping.
- Requires professional installation.

These heaters have to be able to sense water flow in order to work. You generally want a low minimum flow rate, close to about 0.5 GPM, so that the heater fires up if, for example, you only need a cup of hot water.

Installation considerations

Because they're so small, a tankless heater can be installed almost anywhere. In general though, it should be installed as close as possible to the fixtures that use the most hot water throughout the day – typically the kitchen. Gas models require higher gas pressure and volume than tank systems, so your gas meter and piping may need to be upgraded. They also need to be vented, either through an exterior wall or the rooftop. A whole-house electric model will generally require your home to have a 200 amp or greater service, which may require an upgrade to, or replacement of, your electrical service panel. While whole-house systems require professional installation, smaller, electrical point-of-use models can be user installed. They typically have flow rates around 1 GPM, and are designed to service a single fixture, such as a kitchen sink. Most can be wired to a 15- or 20-amp circuit.

There are several things to consider when selecting a tankless system, particularly a whole-house supply, which is why you should use the services of a qualified installer who can help you determine the right size of heater for your home.

Installing a tankless heater in a new house construction or during a major upgrade is the most cost effective. If you're looking to replace an existing tanked system, then you'll definitely want to evaluate the initial purchase price and installation cost against the long-term savings you can expect to achieve, and the forecasted rate increase for the type of power you use.

Sources:
Stiebel-Eltron-usa.com, Rheem.com, Rinnai.ca, Gsw-wh.com

Got Hard Water?

If your water has a high mineral content, the minerals invariably precipitate out of the water and leave behind a solid mineral buildup in water pipes. This hard water scale effectively acts as a thermal insulator and reduces the overall efficiency of the heat exchanger, which can eventually lead to a rupture. So, if you do have hard water, you'll likely want to install some kind of water softener.

CARL DUGUAY
cduguay@canadianwoodworking.com

Go Online for More

RELATED ARTICLES: Shop and Garage Floor Coverings *(June/July 2017)*, Countertops *(Dec/Jan 2017)*

INFO: DIFFICULTY – **3/5,** LENGTH/TIME – **3/5,** COST – **1/5**

Make a 3D Wooden Jigsaw Puzzle

Whether working alone or with friends and family, assembling a jigsaw puzzle can be fun, and completing one can be very gratifying. The same can be said about making one, and watching someone enjoy putting it together (or at least trying to) is especially enjoyable.

BY CHRIS WONG

A wooden puzzle doesn't require much in the way of tooling, and can often be made from scrap wood. Small ones can be completed in less than half an hour, while still providing a good challenge for anyone of any age.

A scroll saw is the ideal tool for cutting jigsaw puzzles. Manual fret saws and coping saws are also viable options and perhaps offer slightly more control, but at the cost of speed, and some skill is required to keep these saws at a consistent angle. A band saw, equipped with a fine blade, would also work for larger jigsaw pieces.

Photos by Chris Wong

Why make 2D puzzles when you can make 3D puzzles?

I made many 2D tray puzzles from Baltic birch before developing a more intricate and complex style of puzzle. Made of solid hard woods up to about 1" thick, 3D puzzles are different from their 2D cousins in that a 3D puzzle is also segmented in multiple interlocking layers. My most complex puzzles involve segments that must be assembled in a particular order, and then those segments must be assembled in order due to tapered one-way joints.

If you can cut 2D jigsaw puzzle pieces, you can cut 3D jigsaw puzzle pieces – the differences are in the positioning of the material as it is being cut and in the sequence of cuts.

Material selection

If you're an experienced scroller, you already know which materials are suitable. What you're looking for is a material strong enough to hold together after significant details are cut into it. Softer woods like pine and fir work, but the pieces have to be a little chunkier to survive.

My preferred material is a tight-grained wood of medium density that isn't stringy and splintery, which often results in any delicate, short-grained areas failing. I'd recommend woods like cherry or maple. These materials are nice to work with and are strong enough to hold fine detail. Denser woods are okay as well, but are harder to cut - cutting small pieces of medium-density 1"-thick material on a scroll saw is enough of a task on its own. I would suggest avoiding wood with splits or other structural defects unless you can incorporate them into the design.

Blade selection

Since we're cutting relatively thick material, I opt for the coarsest blades I can find. A reverse tooth pattern has most of the teeth pointing down with the bottom few teeth pointing up, to ensure a clean cut without splintering on either face. I have been using Olsen Reverse Double Skip Tooth blades with 14 TPI.

Coarser blades are suitable for cutting thicker stock. They are thicker and wider than fine-toothed blades, which means that they leave a wider kerf and can't corner quite as well. This means that your puzzle pieces won't fit together quite as tightly, and knobs need to be more pronounced to interlock. These are not problems, but you need to be aware of the trade-offs when choosing a blade.

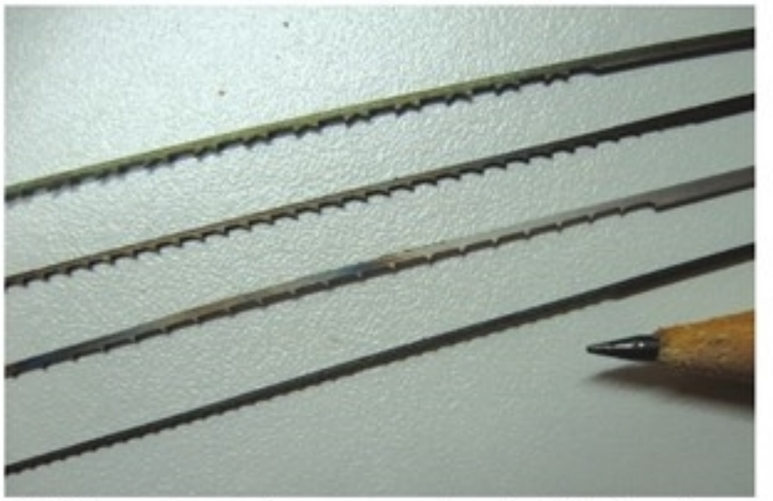
Stock preparation

The material you use doesn't need to be perfectly flat, since there will be some play between the pieces from the saw kerf.

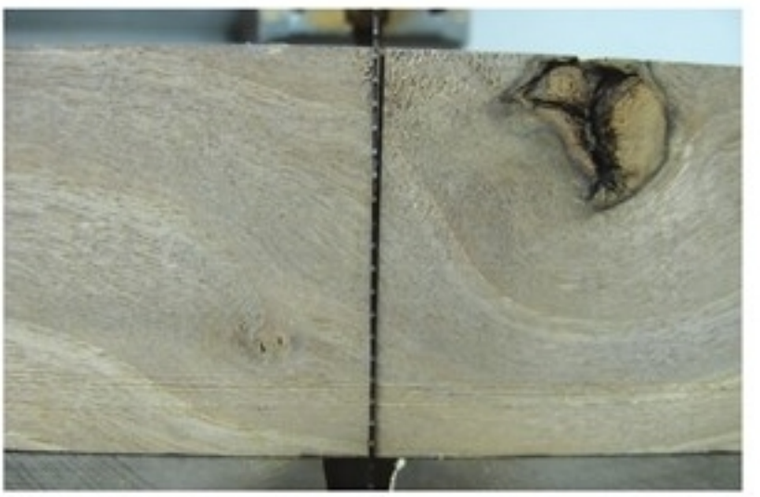
Sanding a bunch of loose puzzle pieces isn't much fun, so it's best to sand the wood up to 180-grit first. Don't forget the edges. While manipulating stock on my scroll saw table, it often gets a little marked up, but at least with the pre-sanding, I minimize the amount of sanding that needs to be done afterwards. Applying masking tape to the bottom surface can avoid the second sanding step, but then you have to remove the tape from every piece afterwards, and I find this to be the more difficult route.

If you want to ensure every piece is the same size, take the time to draw a grid on the top side. The grid should consist of squares about 3/4"-1". Any smaller, and the pieces are hard to hold, and any larger makes stage-two cutting challenging on a scroll saw.

Again, if you don't want to have to sand the marks off afterwards, you can first apply masking tape. You may wish to either draw each knob/socket, indicate which way the knob faces, or simply decide as you cut them. I prefer this latter method and I've never had a problem forgetting to cut a knob.



Blade Types – From top to bottom: crown tooth, standard blade, skip tooth reversing and fine reversing blade. Wong finds the bottom two most useful for jigsaw puzzles.



Check for Straight – It's easiest to create puzzles when the blade is running perpendicular to the table. To check, make a small cut in some wood, then rotate the piece of wood around to the back of the blade, keeping the same face downward. The difference will be doubled and therefore easier to see.

Set-up and warm-up

The scroll saw table should be at a comfortable height. Some scrollers prefer the saw to be tilted towards them, while others prefer it level. One handy feature is a foot switch to allow you to start and stop the saw while keeping both hands on the workpiece. I feel that this is more of a necessity for pierced work, where the blade often starts in contact with the work, but it is still a valuable accessory and helpful in case the blade binds.

Install the blade in the scroll saw and apply tension. I go by sound, listening for a sharp ping when plucked. Check that the blade is square to the table as viewed from the front and side. An easy way to check the squareness as viewed from the front is to make a stopped cut in a thick piece of material and, with the saw turned off, rotate it 180° around the blade and see if it will slide over the back of the blade from the rear.

Subscribe & Save • Give a Gift to a Woodworker

HOLIDAY SALE

SAVE $10

GIFT OFFER

Renew your own subscription and give a gift –
both entered into 2 ongoing draws EVERY ISSUE!

1st Gift $24 PLUS TAX
Additional gifts only $14 PLUS TAX
THE BEST PRICE YOU WILL SEE!

Cross someone off your gift list TODAY!

PLUS 2 CHANCES TO WIN

1

RIDGID

18V LITHIUM-ION CORDLESS BRUSHLESS 1/2 INCH 2-SPEED DRILL/ DRIVER KIT FROM RIDGID MODEL R860053SB
Retail Value $99.00

2

ALL SUBSCRIBERS, EXISTING & NEW, HAVE A CHANCE TO WIN A $250 GIFT CARD FROM LEE VALLEY!
Draw period ends Jan. 31, 2018

Finish your Christmas Shopping today ORDER NOW! OFFER EXPIRES DECEMBER 31ST, 2017

ONLINE
www.CanadianWoodworking.com/give

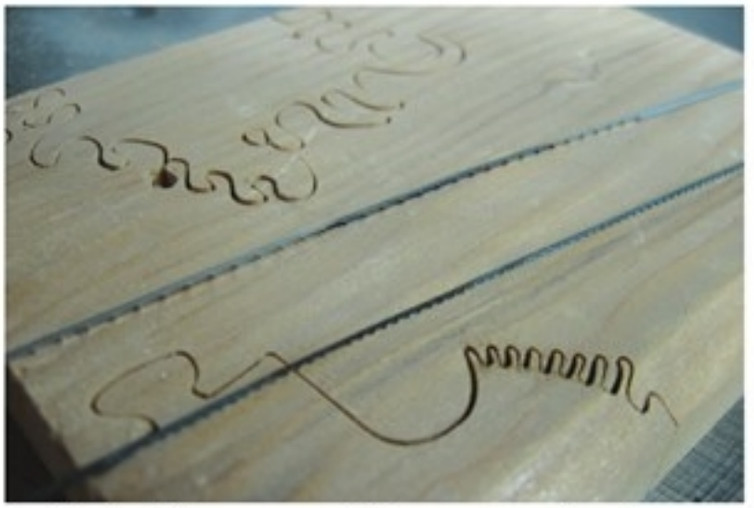
MAIL
the postage paid card in this issue

FAX
the card to 1-902-462-3336

EMAIL
orderdesk@canadianwoodworking.com

PHONE
Call our friendly Customer Care Team **1-800-204-1773**

OFFER CODE: PA17



Practice First – Using some waste is the best way to get to know what your scroll saw is capable of, and how different blades cut.

Helping Hand – A clamp will help secure smaller workpieces so that cutting them is safer.

Before starting work on the actual work piece, I like to warm up and spend a few minutes making some back-and-forth cuts in material from the scrap bin. This will give you a chance to get used to how the blade and saw cuts, and gauge how tight the corners are you can make. Cut some knobs too, for practice.

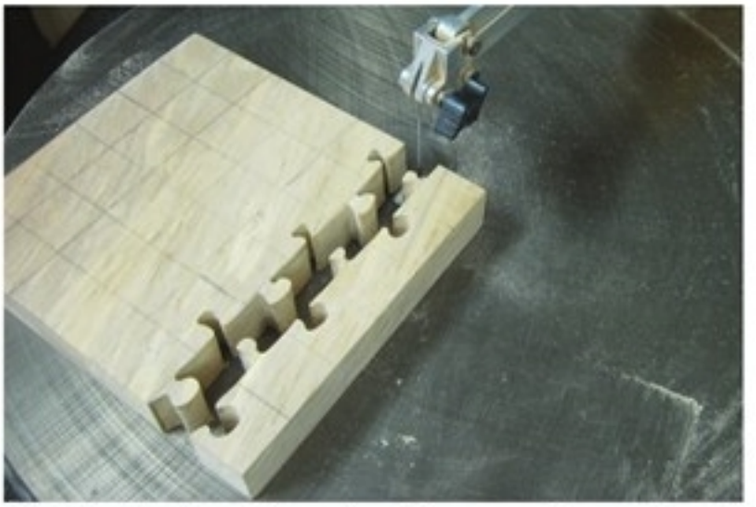
About jigsaw puzzles

To understand how to cut a 3D puzzle, it helps to be familiar with how to cut a regular jigsaw puzzle. The success is largely dependent on your dexterity and control with the saw. Despite my experience with a scroll saw, I still find that the saw is capable of cutting curves tighter than I think it should. Therefore, when making cuts on the scroll saw, I move the wood how I want to cut it, not necessarily what I think the saw can handle. And I have made more than a few cuts that surprised me.

Smooth, flowing movements are key to nicely rounded shapes. Start-and-stop movements will usually result in faceted surfaces that don't look as nice.

The knobs and sockets are what hold puzzle pieces together. They are cut at the same time, with only the kerf of the blade between them. This means that you don't have any room for relief cuts, and your only way is forward.

A good jigsaw puzzle knob is pronounced enough from its neck to be trapped in the socket. This exact amount will depend on the kerf of the saw blade being used. The neck also needs to be substantial enough to withstand handling.



Cut Strips Off – To start, Wong marks a grid pattern onto the upper surface of the workpiece, and then cuts strips off it.

The knob also cannot be so large that the socket of the mating piece is weak. When determining the size of the knobs and sockets, keep in mind that the puzzle piece will require 1-3 more knobs/sockets on its other edges. Despite the apparent fragility of a completed 3D puzzle, I feel that they are quite rugged, and I can throw and spin them in the air without them coming apart.

A few pointers

Have a clean space to put puzzle pieces that you're not sawing, so you don't lose any. If you don't want to have to solve the puzzle once it's cut, assemble the cut pieces as you go, or at least put them

Part Way Done – With the puzzle strips complete, you have to decide how intricate you want to be. An easy approach is to just cut the puzzle pieces from the strips, though there are lots of options for more difficult-to-assemble puzzles.

down in the correct orientation, like an exploded diagram.

Some of the cuts are quite demanding, even with a powerful scroll saw and sharp, coarse blade. It's important to keep a firm grasp on the puzzle pieces, which gets harder as they get smaller. If the blade binds, shut the saw off, free it and try again.

Some scroll saws have an adjustable foot to keep the work from being carried upwards by the blade. While effective for material of even thickness, they are more of a hindrance when cutting small puzzle pieces, especially in stage two, when the thickness will vary. If you have difficulty holding small parts, or are uncomfortable getting your hands close to the blade, try using a small wooden handscrew clamp to hold the puzzle piece. This is a trick I use occasionally.

Once a piece is cut in half and the thickness reduced, you may wish to switch to a slower-cutting fine blade for better control. If your saw has variable speed, you may also wish to reduce speed.

Jigsaw blades are inexpensive and are sold in packs of 12 for a reason – they are disposable and should be replaced frequently. Signs of a dull blade include a decreased cut rate and burning. Anticipate wearing out a blade after cutting about 100 jigsaw pieces of soft maple. If a blade binds and gets kinked, it should also be replaced.

Cutting the puzzle

For your first 3D jigsaw puzzle, a 1"-thick piece of wood about 4" square is a good start. Though I cut a 6"-square puzzle for this article, the process is exactly the same. Draw a 1" grid on one face.

Each jigsaw edge is cut the same way in seven steps.

- Start the cut on a gridline, cutting along the line. We will call this 0°.
- When you are one quarter of the way towards the next intersection, swing the material 100–200° counterclockwise in a fluid motion to start the knob.
- Swing the material the clockwise to get back to 0°.
- Cut straight just a little so that the neck of the knob won't be too thin.
- Reposition your hands and swing the puzzle 100–200° clockwise.
- Rotate the puzzle counterclockwise back to the grid line, cutting at 0°. Ideally you get back to the grid at around the three quarter mark. Follow the grid line until you reach the next knob/socket.
- Continue this process until an entire strip has been separated from the puzzle.

For our 3D puzzle, we are going to start by reducing our puzzle blank into a series of strips Each strip should be approximately 1" wide - any thicker will be harder to cut in the next stage.

Work on the far left row, and follow the seven steps for each square on the grid. Then saw another strip. Mixing up the orientation of the strips (north/south vs. east/west) makes the puzzle more challenging to assemble.

When you're down to a handful of strips, you have to decide how challenging to make the puzzle. The seven steps to cut the pieces remain the same; only the sequence of cuts and orientation of the material changes.

Easy: you can simply cut each strip into individual puzzle pieces, following the grid lines that run across the strips. In my case, this will yield a 36-piece puzzle.

3D Puzzle Pieces – One option is to cut the strips on edge, turning the project into a multi-layer puzzle.

Final Cuts – With the puzzle cut into two layers, it's time to cut the individual pieces out. Be careful not to create pieces that are too weak, as short grain can be your enemy.

Medium: to increase the difficulty and number of pieces, cut the individual pieces for the easy version, then turn each piece on edge and cut a knob/socket in this orientation. In my case, this separates each piece into a top and bottom, resulting in a 72-piece puzzle.

Moderate: Turn each strip on edge and cut a knob/socket in each puzzle piece along the strip, separating it into a top and bottom strip. Flip each strip back to its regular orientation and cut the strip into individual pieces. This also yields a 72-piece puzzle.

Hard: Alternate between edge- and face-up cuts. You can continue splitting pieces as far as possible, based on the material left to work with and your skill level with the saw.

Fun variations

For a more interesting puzzle, try moving away from a straight grid and cut curved pieces instead. Keep in mind that curved pieces are tougher to balance on edge for stage-two cuts.

To make a borderless puzzle, start by cutting knobs and sockets around the perimeter and discarding the offcuts before cutting the actual puzzle.

Finishing

Once the puzzle is cut and reassembled, sand the surface with a random orbit sander up to 220-grit abrasive to remove any burrs, layout marks or rub marks.

You may choose to apply a design to the surface with paint, pencil crayons, heat transfer, pyrography, or some other method. Or you may choose to leave it to Mother Nature, with wood grain and colour as the only hints.

CHRIS WONG
chris@flairwoodworks.com

Go Online for More

RELATED ARTICLES: Children's Blocks *(Dec/Jan 2012)*, Recipe Box *(Dec/Jan 2011)*

Revolutionary DVR Drive Lathe

The **Nova Galaxi DVR 1644 Lathe** has more features than any lathe in its class. The 1-3/4 HP Digital Variable Reluctance motor delivers variable speeds from 100 to 5,000 RPM. Features digital readout, electronic auto brake, 16" inboard turning (29" outboard), 44" between centers, self-ejecting tailstock centre; and 360° swivel head. **KMSTools.com**

Folding Saw Stand

The **Magnum EZ-Fold Mitre Saw Stand** performs where you need it – on the jobsite or in your workshop. Features adjustable infeed and outfeed supports for stock up to 106" in length, a telescoping levelling foot, ad a folding design for easy transportation. Compatible with most miter saws. **KMSTools.com**

All the Power, None of the Noise

Cut down on shop noise with the ultra quiet, super light **King Canada KC-1410A Oil-Free Air Compressor**. Its 3/4 HP motor purrs along at 60 decibel, delivering 1.2 CFM at 90 PSI and 1.8 CFM at 40 PSI – which means you can easily run brad and finish nailers, pinners, and light duty staplers. Features a 1 gallon tank and standard 1/4" connector. **KingCanada.com**

Shine a Light on Your Work

There are times in the workshop or on the job site when you need extra light to see your work clearly. The **King Canada 2202LED-C 20-watt Cordless LED Worklight** delivers 2,200 lumens of bright task lighting to the job. It also has magnetic feet for service applications and charges with both AC and 12V (automotive) power. **KingCanada.com**

The Secret to a Dust-Free Shop

Keep you shop dust-free while protecting your respiratory system from exposure to fine dust with the **Grizzly G0703 1-1/2 HP Cyclone Dust Collector.** Powered by a standard 120V outlet it has a suction capacity of 775 CFM (at outlet) and a 0.2-2 micron high efficiency canister filter. Includes a remote control for easy on/off operation. **Grizzly.com**

Finally, Affordable Drum Sanding

A drum sander is the perfect machine for quick and efficient sanding of veneered and solid panels, but they tend to be large and expensive. The affordable **Grizzly G0458Z 18" Open End Drum Sander** is ideal for the small shop. Get consistently smooth results on stock from 1/8" to 4-1/2" thick and up to 36" wide. **Grizzly.com**

Rip and Crosscut Panels Perfectly

Processing sheet goods on the table saw can be nerve racking and dangerous. Not so with the **Grizzly T10687 9- amp Track Saw.** Make perfectly straight cuts quickly and easily. Also cut solid stock up to 2-5/32" thick. 28" and 58" guide rails and rail connectors are available.
Grizzly.com

The Perfect Finishing Gun

The **GREX 850LX 21-Gauge Nailer** is equipped with all the features found in GREX TOOLS including their unique integrated edge guide. Light weight, it shoots brad nails from 3/8" to 2". GREX 21 gauge fasteners feature superior holding power versus 23 gauge fasteners, while still leaving a nearly invisible hole for filling and finishing. **GrexUSA.com**

For the Smoothest, Cleanest Cuts in Sheet Goods

This **A.G.E. MD10-601 10" blade** is specifically designed for clean cuts in plywood, MDF, chipboard and single-sided laminates. It leaves a smooth, clean, chip-free finish on the top and bottom edges. The greater number of teeth, triple-chip grind and 12° hook angle provide an excellent balance between feed resistance and cut finish. **AGEcuttingtools.com**

Extreme Bandsawing

If you're looking to rip large planks to size, resaw lumber into veneer, or cut complex shapes in the thickest of stock, you need the power and features offered on the **Laguna 18|Bx 3 HP, 220V Bandsaw.** This premium machine has all the features you'll want, at a price you can afford.
Laguna.com

shopnews

Sponsored Content

Titebond III - An Adhesive That Does Everything

Titebond III Ultimate Wood Glue is the first one-part, water cleanup wood glue ever offered that is proven waterproof. The waterproof formula passes the ANSI/HPVA Type I water-resistance specification and offers superior bond strength, longer open assembly time and lower application temperature. Titebond III is non-toxic, solvent free and cleans up with water – safer to use than traditional waterproof wood glues. It provides strong initial tack, sands easily without softening and is FDA approved for indirect food contact (cutting boards). The ultimate in wood glues – ideal for both interior and exterior applications. For more information, visit **FranklinInternational.com**.

Make Quick Work of Pruning

The **Makita DJR183Z Cordless Reciprocating Saw**, with its 1/2" stroke and 0-3,000 SPM, is ideal for light to medium demolition work around the home or on a jobsite. And, equipped with a Makita 723053-A-5 or 723052-A-5 blade it does a remarkable job pruning tree branches up to about 3" diameter. Tame your back yard. **Makita.ca**

Get Perfectly Precise Cuts with any Circular Saw

The secret to getting straight, clean rip and cross cuts with your circ saw is to use a Hi-ATB blade and the **Bora 50" WTX Clamp Edge And Saw Guide Kit**. Works with most left or right handed saws. Made of heavy grade aluminum for a lifetime of use and expandable for up to 8' of cutting capacity with optional accessories. **BoraTool.com**

Smart Turning Tools

Sharpening turning tools can be difficult for novice woodturners, and time consuming for experienced turners. The **Rikon Model 70-800 Woodturning System** uses replaceable Carbide Insert Cutters. You get a 16" aluminum handle and three 8-3/8" steel shafts equipped with a replaceable Circle, Square, and Diamond cutters. Simpler to use, smoother results, less sanding. **RikonTools.com**

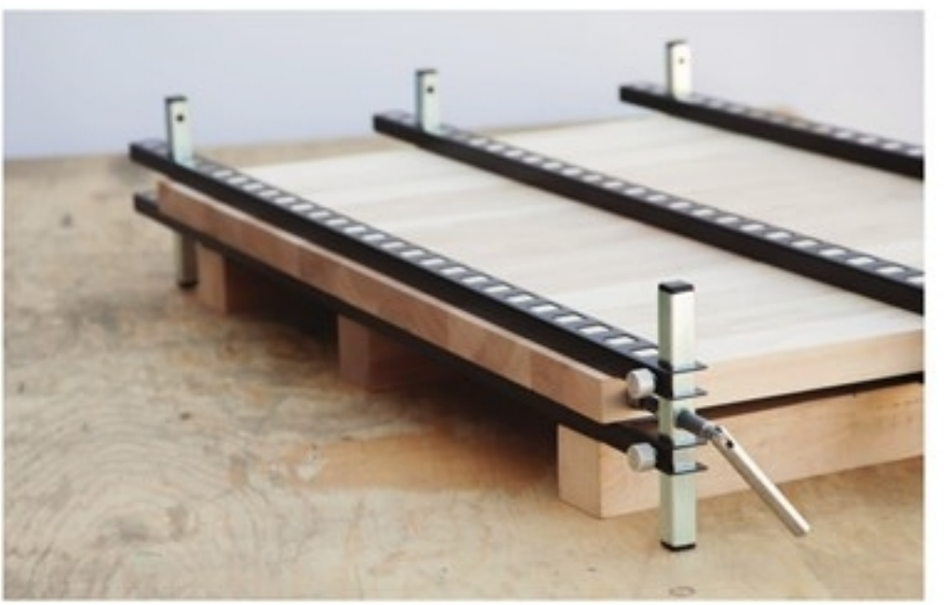
The Improved Pipe Clamp

Although viewed as a more traditional tool, the pipe clamp can be found in nearly every workshop. The **BESSEY H Style Pipe Clamp** has a stable base, smooth action ACME thread and a large clamping contact surface. It also comes standard with pads. Available in 1/2" (PC12-2) and 3/4" (PC34-2) versions, the cast construction is designed for years of reliable service. **BesseyTools.com**

Quick and Easy Panel Clamping

The Canadian-made **Damstom Panel Clamps** are a lower cost alternative to commercial panel presses and more convenient for those who don't want to make their own clamping system. Available in 24" and 38" lengths they accommodate panels from 3/4" to 4-1/2" thick. Powder coated steel rails won't flex under load, deliver even pressure to perfectly align boards, and dried glue is easy to remove. Damstom is expanding in Western Canada, and seeks qualified dealers – contact Simon at sbeauregard@damstom.com

Damstom.com



Organize, Sort, and Transport

It can be frustrating keeping tabs on all the small tools, hardware, and accessories we use in the shop and on the jobsite. The **DeWALT TOUGHSYSTEM** provides a set of three modular, stackable, lockable storage units and a convenient L-cart carrier to move them about. Now available as well is the Toughsystem Radio. Functional, durable, and built tough. **DeWALT.ca**

A Cordless Nailer For Any Job

Whether it's for framing, flooring, cabinetry, or furniture making, choose from 4 new **DeWALT 20V MAX Cordless Brushless Nailers** that are right for the job. These lightweight and compact nailers have a wealth of features including tool-free depth adjustment, tool-free selectable trigger, and low nail lockout. Backed by a 3-year warranty. Cordless from start to finish. **DeWALT.ca**

Cut the Cord, Not the Power

If you use a brad nailer, pinner, or stapler for trim work or finish nailing, the **DeWALT FLEXVOLT 60V MAX 2.5 Gallon Cordless Air Compressor** has the power and convenience you need. Sink over 1,200 nails on a single 6.0Ah battery charge. Features a brushless motor and unique OneTurn self-regulator. **DeWALT.ca**

Two Sawing Tools in One

Increase your productivity and save time and money with the **WORX Axis WX550L** combination jigsaw and reciprocating saw. Powered by a 20V MAX Power Share battery, it's compact and lightweight. Uses standard recip and T-shank jig saw blades. Axis's articulating arm is fixed at 90°. Press the tool's pivot release button and it converts into a recip saw. **CanadianTire.ca** **Lowes.ca**

The Smarter Cordless Drill

The **WORX Ai Drill (WX178L)** has an advanced intelligence electronic keypad with three functions: BitLock, SafeDrive, and PulseAssist. BitLock's motorized jaws tighten around bit shanks with 30 percent more holding power. SafeDrive automatically drives screws flush to the work surface and then backs off. PulseAssist applies just enough bit rotation to drive and reverse screws without stripping the head. **Lowes.ca**

Your Portable, Compact Sidekick

A lightweight worktable, the **WORX Sidekick (WX066)** weighs 13 lbs. and sets up in seconds. The sturdy 23.6" x 23.6". tabletop is supported by a tubular steel leg set that folds up for transport or storage. The worktable supports loads up to 300 lbs. and has a working height of 32". Use in the workshop, garage, patio or yard. Four clamp dogs are provided for holding lumber and other materials. **Amazon.ca**

Cleaner, Faster Sharpening

Diamond sharpening stones are a great way to keep your cutting tools sharp and ready for any job. Trend's new **Workshop Diamond Stones** have 600 grit on one side, 180 grit on the other. They'll never dish out, won't crack if dropped, are maintenance-free, and cut noticeably faster than water stones. **Trend-UK.com**

The Ultimate Sharpening Kit

This limited edition **Trend Diamond Sharpening Kit** has everything you need to keep all your tools razor sharp. It includes two dual sided 1000/300 and 600/180 grit stones, lapping fluid, honing compound, leather strop, and storage case. Great for the shop, perfect for the jobsite.
Trend-UK.com

Handle Sheet Goods and Doors with Ease

Lift sheet stock, entry and fire doors, and large panels, up to 440 pounds, with ease. As well as being able to move heavy stock up 60mm in height, the **Trend Heavy Duty Door & Board Lifter (D/LIFT/C)** incorporates a swiveling feature that provides side-to-side movement. Robust steel construction with a non-slip rubber foot pad for better grip.
Trend-UK.com

Love Your Lungs

Continued exposure to fine dust, especially silica dust, is likely to cause you grief down the road. Protect your lungs with a **Trend Air-Stealth P3 Respirator.** This small, lightweight half-mask filters 99.99% of airborne particles and can be worn under a visor. A bottom mounted exhalation valve eliminates steam and fog on your visor or glasses.
Trend-UK.com

Jig and Fixture Hardware

Woodworking jigs are a staple in just about every workshop. They help increase accuracy, speed up complex joinery operations, and increase user safety. **BlackJack** has all the jig accessories you need, from T-bolts to HDPE plastic, T-tracks and jig knobs.
BlackJackCompany.com

Turn Your Oscillating Multi-Tool into a Multi-Cutter

The unique three cutting surfaces on the new **Fein Multi-Cutter** blade enable you can cut a wide range of materials, including carpet, PVC flooring, cardboard, bitumen shingles, and roofing fabric. Cut in tight and hard-to-reach places. Fits most brand of multi-tools.
Fein.ca

Renovators, Finish Carpenters – Meet Your New BFF

The cordless **Fein MultiTalent QuickStart** oscillating multi-tool, with its two high-performance batteries, will keep you running on full, all day long. The self-supporting motor has practically no vibration, it's super quiet, and offers tool-free accessory change. It's your new Best Friend Forever. **Fein.ca**

Affordable 3-D Carving

Carve expensive corbels, cut intricate inlays and engravings, cut plaques, ornamental boxes, and precision parts for your projects with the all new **CNC Piranha XL.** Fits easily on the end of a workbench yet features a large 12" x 24" cutting area and comes with VCarve software. **NextWaveAutomation.com**

Instantly Measure Angles

The durable, precise, and convenient **AccuMASTER 2-in1 Digital Angle Gauge** enables you to find true level and precisely check any angle on saw blades, jointer fences, drill press and band saw tables, and more. Features a large, bright Stayglow reversible display, readings in°, inches/feet, millimeters/meters, and percent slope, and a strong magnetic base. **CanadianCalculatorWarehouse.com**

Production CNC for the Small to Mid-Size Workshop

With its 25" x 50" cutting table, the **CNC Shark HD4 Extended** is perfect for carving and machining a large variety of projects in wood, soft metals or plastics. Now with Color Pendant Controller and CNC Shark HD4 Exclusive Auto Alignment. Features a heavy duty gantry reinforced with plate aluminum, and anti-backlash wear-compensated high precision lead screws. **NextWaveAutomation.com**

Dust-Free Orbital Sanding

Sand more quickly and virtually dust-free with the ergonomic and lightweight **Mirka MR-35SGV Orbital Sander.** Weighs only 1.8 pounds and with the 3mm orbit, it is ideal for smaller sanding jobs and delivers a superior finish. When bought as kit MCA-MR35SGVK it includes five packages of Abranet sheets in 80, 120, 180, 240 and 320 grits. **Mirka.com**

Helical 8" Benchtop Jointer

Not every workshop needs a huge stationary jointer. The Magnum Industrial MI-81180 8" Bench-Top Jointer gives you the cutting capacity of a larger machine with the convenience of a benchtop model. A helical cutterhead, with 16 double-sided carbide inserts, and powered by a 1HP motor, give super clean cuts in any type of wood. **KMSTools.com**

The Universal Dust-Free Router Hood

This unique router accessory from Oneida Air captures nearly all the wood chips and dust produced by hand held routers. Molded from clear polycarbonate – the material used for industrial safety glasses – the **Universal Dust-Free Router Hood** offers excellent clarity and superior durability. It's designed to work with most of the fixed base and plunge style routers from major brands. Tame the Dust! **Oneida-Air.com**

Three Knife Starter Kit

The **Flexcut 3-Knife Starter Set** contains 3 of Flexcut's most popular knives: KN12 Cutting Knife, KN13 Detail Knife, KN14 Roughing Knife, along with Flexcut Gold polishing compound. The comfortable curved ergonomic handles allow for long periods of carving without hand fatigue. 100% North American made, assembled and sourced. **Flexcut.com**

Keep Warm in the Shop or on the Jobsite

Here is one hot tool guaranteed to keep you warm during the harshest winter days. The **Ridgid GEN5X 18-Volt Hybrid Forced Air Propane Heater** delivers a 30,000 to 60,000 BTU output on a standard 20lb tank. Brushless technology ensures a longer motor life. Includes an electronic igniter button and UL certified overheat protection. **HomeDepot.ca**

Tersa Planer Knives – The Original

TersaKnives is the Canadian source for all your Tersa planer knives. They carry knives in HSS, Carbide, Chrome M42 Steel in 40mm to 810mm lengths. You get the best prices plus same or next day shipping, and free shipping on orders over $250. **TersaKnives.com**

Every Woodworker Needs a Great Knife

Whether it's for carving, scoring or marking, a sharp knife is an essential hand tool. **Flexcut Knives** are precision made and hand sharpened for maximum performance. Curved ash handles allow for maximum comfort – regardless of how long you use them. With 16 styles to choose from you'll find the right one for any job at hand. **Flexcut.com**

Cordless Without Compromise

Get the power of a corded sander with the convenience of lighter weight with a **Festool Cordless Compact Sander.** Features a brushless motor, ergonomic design, and 30 minute run time (with an 18V 3.1 Ah battery). Use with an AC adapter for continuous operation. Three models to choose from – 80x130mm orbital, 100x150mm detail, and 125mm random orbital. **FestoolCanada.com**

Formaldehyde-Free Sheet Stock

The soy-based adhesive in **PureBond Hardwood Plywood** eliminates any added formaldehyde from Columbia Forest Products standard veneer-core and pMDI composite hardwood plywood core panels. What really makes PureBond special is that it's cost competitive with the standard urea formaldehyde (UF) construction that you'll find in most decorative veneer-core hardwood plywood on the market today. Manufactured exclusively in Canada and the US, PureBond is even more water resistant than UF panels. Better for you, better for the environment.
PureBondPlywood.com

shopnews

Sponsored Content

King Deluxe 18" Wood Bandsaw

The KC-1802FXB ultimate 18" deluxe resaw bandsaw was recently unveiled by King Canada, boasting a powerful 3-HP motor and a full 16 amps on 220 volt to power two cutting speeds. Precision balanced cast iron wheels and adjustable upper and lower dual Bakelite rub blocks blade guide system with five ball bearings and 10 contact points make this bandsaw extremely accurate. The hydraulic blade tension gauge ensures consistent tension on the blade. King increased safety with a stock feed device for short cut-off workpieces, ensuring fingers stay away from the blade, a magnetic safety switch, safety foot brake and a laser guide attachment to indicate the cut line. The standard Tru Rip 6" resaw fence rounds out the package. Visit **KingCanada.com** to learn more.

ISOtunes Noise Isolating Bluetooth Earbuds at Tegs Tools

ISOtunes PRO IT-01 are the world's first Bluetooth headphones that provide the benefit of proven hearing protection. So when you're working around the house, shop or jobsite, you can appreciate your music while protecting your hearing. They meet OSHA and NIOSH standards as workplace hearing protectors with a 27 dB Noise Reduction Rating (NRR). The memory foam eartips maximize noise isolation, comfort and sound quality, while the latest Bluetooth technology brings you a quick and seamless connectivity experience that's safer for use in the workplace. The battery life is excellent, providing 10-hour music playback and talk time with 240-hour standby time. $129.99 CAD. Available at **tegstools.com.**

The Ultimate in Free-Form Power Carving

The unique spherically shaped **Arbortech Ball Gouge** attaches to any standard 4" and 4-1/2" angle grinder to give you the ultimate in free-form power carving – sculpt with texture, make small spherical shapes or just remove wood in a delicate fashion. Self-sharpening technology and anti-grab design make this accessory a carvers dream tool. **Arbortechtools.com**

Colour and Protect in a Single Coat

RMC Oil Plus 2C is a two component finish, available in 40 standard colours that can be applied to any wood surface. It's comprised of an oil and an accelerator that you mix together and then easily apply with brush, pad or cloth. The result is a quick drying superior finish that is wear, water, and heat resistant finish, and 100 percent VOC-free. It cures fast, and after 5 days the surface can be cleaned with water and soap. A beautiful finish in no time, with no mess. Available in 350 ml, 1.3 L and 3.5 L duo cans. **RubioMonoCoat.com**

The Most Powerful 5-Stage HVLP Spray System On The Market

Equipped with a Heat Dissipation Box that removes any heat build-up from the turbine case, and a Noise Reduction Cover that reduces noise, the **Fuji Mini-Mite 5 Platinum T70** is an industry favourite. It's powerful, portable, and perfect for all fine-finishing. Includes a 'Bonus 5-for-5 Package' that consists of a 6' Whip Hose, Wet Film Gauge, Cleaning Kit, Extra Filters and "Always Measure" Booklet. **FujiSpray.com**

Combination Jointer/Planer Offers Superior Performance

With the **Scorpion CWI-JP1604HC** you get both a 16" jointer and a 16" planer in a compact machine that is perfect for the smaller shop. It features super quick changeover, a 4HP motor, and a 5-row helical cutter head with 80 carbide insert knives that deliver exceptionally clean cuts and superior performance. **CWImachinery.com**

Superior Helical Cutterheads

The **CWI-HC13 Stinger** cutterhead is specifically designed to dramatically improve the performance of the DEWALT DW735 portable planer. Its 4 rows of knives and 40 knives deliver superior cuts, especially in figured woods. Also available for other planer models. **CWImachinery.com**

The Multi-Function Sanding Machine

With the **Sandx CWI-S1042** heavy built benchtop 1" and 2" x 42" belt and 8" disc sander you can tackle a myriad of sanding jobs. It has an extra strong 3/4HP motor, and both the belt and disc sanders have have cast iron tilting tables. **CWImachinery.com**

Full-Featured Sliding Table Saw

The **Stallion CWI-T1204-S4** Sliding Panel Saw delivers exceptional cutting quality. It features a 12" saw blade with 4HP motor, 48" sliding table to facilitate processing sheet stock, and a second scoring saw blade with its own 3/4HP motor for extra clean cuts – all in a small footprint for space challenged wood shops. **CWImachinery.com**

The Workhorse Bandsaw

The **Stallion CWI-B2013 HD Series** 20" bandsaw is equipped with a 4HP motor, solid cast iron wheels, a massive ribbed cast iron table, foot brake, a precision resaw fence that can be easily adjusted for blade drift, and a mobility kit. And, a lovely 13" resaw capacity. **CWImachinery.com**

A Heavy Duty Lathe That Sets A New Standard

The **Rivolver CWI-WL650** offers a 16" x 43" turning capacity and a bevy of excellent features. A 2HP motor drives a poly flat groove belt in three different speed ranges infinitely variable from 45 to 3750 rpm. Notable features include an electronic digital read out and 360° swiveling headstock. **CWImachinery.com**

Hang Like a Pro

The **Hang 'Em Fast Joist Hanger** (1010-508) is the fast and easy way to install joist hangers on all sizes of dimensional lumber. It not only makes the job go a lot quicker, it improves accuracy and easy of nailing. The high strength polypropylene handle is made to last.
HomeHardware.ca

Hard Hitting Without the Kickback

This **16oz Straight Claw Milled Face Framing Hammer** is drop forged in one piece – there are no welds to come apart. The longer 15-1/2" design gives it the striking power of a 28oz hammer, but without the added weight, while the triple injected handle reduces vibration and kickback. **HomeHardware.ca**

The Fast Acting Furniture Stripper

These fast acting Canadian made strippers penetrate intricate surfaces to effectively remove multiple layers of paint, varnish and stain from wood, metal, masonry, antiques and fine furniture. **Heirloom Furniture Strippers** won't harm veneer or raise the wood grain. Eliminate the need for harsh sanding and achieve a professional finish in 4 easy steps! Semi-gel and thick gel formulas are available in 946 mL and 3.78 L cans.
Recochem.com

shopnews

Sponsored Content

Little Ripper Bandsaw Blade

When re-sawing or cutting straight we recommend our 5/8» x .025» x 3 or 4 TPI high tungsten impregnated silicon hard-edge hardback blade. It will make cuts faster and cleaner than a normal bandsaw blade. The extra hard tooth stays sharp longer and cuts straighter. It performs like a wider blade, but uses less HP to run, as it has a thinner body than a standard re-saw blade and cuts extremely smooth. For optimum performance blade speed under 3100 LFPM a 4 TPI is recommended, and over 3100 LFPM should be 3 TPI. Visit **www.TuffTooth.com** for more information.

Varathane
SINCE 1958

Professional CLEAR FINISH

CHANGING THE RULES OF WOOD FINISHING

A self-levelling clear coat with a slightly amber finish, Varathane Professional Clear Finish dries up to 50% harder than conventional clear finishes.

Enhances the natural beauty of the wood while providing long-lasting protection on cabinets, panelling, mouldings, furniture and more.

RUST-OLEUM
CONSUMER BRANDS CANADA

www.rustoleum.ca

INFO: DIFFICULTY – **2/5,** LENGTH/TIME – **2/5,** COST – **2/5**

9 Neckties

Turn Your Tie Collection Into a Centerpiece

We all know ties are the focal point of a man's suit. In the meantime, why not show them off with this easy-to-make project?

Photos by Crystal Jessup (crystaljessupphotography.ca)

BY DREW JESSUP

This tie box was specifically designed to neatly display collections of men's ties by rolling them and placing them in an individual block. This project offers an alternative to creasing or wrinkling ties by draping them on clothes hangers or folding them up. This particular box was designed to either hang on a wall or sit on top of a dresser or preparation area. It features rabbet joinery using dado and rabbet cuts to conceal the unfavourable appearance of end grain, while keeping a sleek, modern look. The box features nine display areas, but could be customized for holding a different number of ties, or even items other than neckties.

The outside dimensions of the boxes I make are 12" high x 12" wide x 3-1/2" deep. The shelves are cut to size once the outer structure of the box has been built. The four sides are 3/4" thick and the shelves are 3/8" thick. I use a 3/4" thick back, but a 1/2" thick back would work fine, as long as you don't rout the keyhole slots to hang the tie box through the front surface of the back.

Planning and cutting the outer box

I dressed the maple to 3/4" thick, jointed one edge and ripped it to 3-1/2". At this point the planning process started. I choose the section of the board that will lead to the most seamless grain when all four sides are assembled for the shell. As a result the board is cut in a sequence of bottom, side, top, then side. Rough cut the parts to length with a mitre saw, then cut the sides to finished length. We'll cut the top and bottom to finished length after the rabbets have been cut into the sides.

Make the rabbet cuts in the sides to accept the bottom and top, then machine the rabbets in all four parts to accept the plywood back. All the rabbets should be 3/8" deep. Set the depth to 3/8" and make the cuts. Now that we know the depth of the rabbets we can cut the top and bottom to finished length.

Next, sand what will become the inside surfaces of the box, and apply a few coats of finish to the inner surfaces of the four shell pieces; I used a satin water-based polyurethane. By applying the finish at this point it reduces any drips or bubbling that would occur if finishing after assembly. The shell of the box is now ready for assembly. Assemble the shell of the tie box, making sure the unit is square. Clamp and let the glue set. Sand the outer surface of the shell so the end grain is flush with the sides. Apply polyurethane to the outside and front edge of the shell. The next step is to cut the back of the box and the shelving.

The back panel

Cut the plywood back to fit inside the rabbets that were machined in the box shell. Ensure the fit is accurate, then rout the wall hanging slots in the back with a keyhole bit. Locate the slots in the middle of the back, and space them 6" apart for easy measurement while hanging.

The shelves

Plane the shelving material to final thickness, then cut it 2-3/4" wide, and to length so the parts just barely fit inside the shell. Keep in mind that the height and width may be slightly different dimensions. Mark the parts to reduce confusion down the road.

Install a 3/8"-wide dado blade and adjust the height of the

Box Assembly - Use parchment paper over each clamp surface to prevent any glue squeeze-out from sticking the box to the clamp. Ensure the shell is square before leaving it to dry.

Rout the Keyhole Slots – Jessup has developed a jig to make routing the keyholes more efficient and accurate, but to do just one tie box you can simplify the process. With the back fixed in place, all that is needed is a straight edge for the base of the plunge router for reference, and a start-and-stop block to limit the travel of the router.

Machine Half Laps in Shelves - Be sure to use an offcut at the back when making your pass through - this will prevent any snipe from affecting a finished shelf. Jessup does this operation with a dedicated jig, but a mitre gauge with a fence to fully support the workpiece can also be used.

Install the Back - Make sure to have enough parchment paper to cover the back of the box, as well as eight off-cuts to better distribute the clamp pressure and prevent marking on the finished paint.

Finished Shelves - The machined and painted shelves are ready for assembly. You could also opt for a different finish or wood species when creating the shelves, so they either match or complement the shell. Simply slot the shelves together and insert them into the shell.

blade to 1-7/8". Set the fence to locate the cuts evenly across the length of the workpieces. I use a templated 1/2" plywood jig with its own fence perpendicular to the table saw fence to cut mating parts at the same time. This could also be done with a support fence attached to a mitre gauge. Clamp the shelves against the jig fence or mitre gauge and make the initial cut. Turn the shelving end for end, and repeat the cut on the opposite side. To reduce the chance of chipping as the blade exits the workpiece, you can clamp a piece of scrap to the rear face of the shelf pieces. It will support the back side of the workpiece and drastically reduce chipping. Sand the shelving and back to prepare for paint.

Applying the finish

I applied two coats of primer to the shelving pieces and back, sanding between each coat. It's helpful to

Insert the Shelving - Jessup likes it best to have the continuous edge running horizontally. As long as they are cut to length accurately, friction will keep the shelves in place during use.

sand with a 220-grit after the first coat to ensure all grit is smoothed before the next coat is applied. I then apply two coats of paint, repeating the sanding process with 400-grit sandpaper. This ensures a smooth finish coat. After the paint has dried the box is ready for final assembly.

The final stretch

Apply glue to the rabbets on all four sides of the shell. Insert the back and ensure the routed slots face the correct way. I used two small off-cuts at each corner (eight in total) to assist with clamping the back into its final position. One off-cut is placed across the corner, at the front of the shell, while the other off-cut is placed near the corner of the back. Clamp the four corners of the back and allow the glue to set. The last step is to assemble the friction-fit shelving and insert the shelf assembly into the front of the shell. The last step is to hang the box on the wall and fill it with your favourite tie collection.

DREW JESSUP
info@livegoodwood.com

Drew builds tie boxes for his business GOODWOOD in his small 200 sq. ft. shop. When he's not building he's thinking about his next big idea for organizing men's accessories.

Go Online for More

RELATED ARTICLES: **The Saw Tie** ***(Apr/May 2002)***, **Arts and Crafts Hat and Coat Shelf** ***(Feb/Mar 2007)***

One Lazy Son-in-Law

Don's son-in-law helps him build an addition.

BY DON WILKINSON

Last summer my son-in-law came out to help me reroof my home and build a porch addition on the front of my house, although to say he helped me may be a bit of an understatement. Truth be told, he did nearly all the work while I watched. I feel this is as it should be, since he took away my Number One daughter and marooned her and my three adorable grandchildren in the wilds of deepest Manitoba. And yes, I do know that I have four grandchildren but I'm not all that fussy about one of them.

Before he came out he suggested that I get the foundation pit excavated and the footings poured prior to his arrival, since he wasn't about to sit around and wait for the concrete to dry. I couldn't understand his logic; I thought sitting around in the Okanagan sun watching cement dry was a marvelous idea. It sure beat digging the darn hole, I tell you. Luckily, my son was home at the time and was informed he would be more than happy to assist with the digging.

The addition was going to be quite small, about eight feet by twelve feet, and constructed with 2x6 walls covered in stucco to match the original house. After many precise and extremely careful calculations, I estimated that the footings would need to be exactly a bit larger than the room dimensions. And with those calculations firmly in someone's mind, we commenced digging.

Now, my next-door neighbour, Carl, has a creek flowing through his property. Well, technically the creek runs through his house. His basement, to be precise. Weirdly enough, the creek was actually a benefit when it overflowed its banks and drowned his termite and carpenter ant infestation, but that's another story and one that didn't really concern me. What I was concerned about was the possibility that his water feature might have taken a left turn at the property line and I would spring a leak when digging my foundation.

My solution to the potential problem was to excavate the pit as shallowly as possible. We spent nearly a full quarter hour scraping the grass off the entire area before declaring ourselves more than satisfied with a job well done and went inside to relax. It was while we were enjoying our well-deserved rest that The Boy began reading the instruction suggestions the building inspector had left. I burst out laughing when he got to the part that said we needed to dig down three whole feet, and I was rolling on the floor begging him to stop when he stated the footings needed to be a full twelve inches wide. And then I was crying when I realized he was serious.

It took a few days, but eventually we managed to recover enough energy to go outside and pick up our shovels. A few days later we managed to move them out of the way and even pounded some wooden sticks in the ground at what appeared to be logical locations. We then wove some string back and forth between them, somewhat like we had seen once on an episode of "Tool Time." In retrospect, it may not have been a good idea to learn house construction from Tim Taylor. How was I to know that "Home Improvement" wasn't an actual home improvement show?

We were pleasantly surprised to learn, once we started the actual digging, that the ground consisted primarily of sand, and we were able to dig the entire foundations in roughly the right location and in slightly less time than a government contractor would have managed it. And we came in under budget.

Shortly thereafter we had the batter boards nailed into place, and within days they had been moved, not just once, but several times before ending up about where they should have been. Not only that, but they had also been filled with cement by using the able assistance of the cement truck driver after he managed to stop laughing and helped move the batter boards to where they should have been in the first place.

Once the cement had dried, Geoff arrived. He was duly impressed with all my fine work and within days we/ he had the room completely framed up, the outside sheathing on, rough wiring in place, windows and doors installed, closet roughed in and the roof on.

Then he went home and left me with the drywalling to finish.

I tell you, that boy is so lazy.

DON WILKINSON
YukonWilk@gmail.com

Illustration by Mike Del Rizzo

veritas®

Combination Plane

Designed with the discerning woodworker in mind

Originally created to replace stacks of wooden-bodied molding and joinery planes, combination planes are defined by their flexibility. Invaluable for restoration work, a combination plane remains an ideal choice for times when you need to make a short run of custom molding.

The Veritas Combination Plane is the result of four years of research and development. It is precisely machined, easy to adjust and holds settings securely – all features that, together with the improved blade technology, also make it fully reliable in use. It represents our continuing commitment to designing and manufacturing exquisite woodworking hand tools that do not limit the expression of the person that is wielding it. Like all Veritas products, our combination plane is designed with the discerning woodworker in mind; it is built to the highest standards, comfortable to handle, and made in Canada.

We have prepared a 16-page brochure that provides detailed information about the Veritas® Combination Plane. You can view it online or add a copy to your next order.

1-800-683-8170
leevalley.com

Configure the plane for left- or right-hand use or to accommodate grain direction.

Accessories
Two Baltic birch plywood boxes are available separately: one provides a place to keep the fully assembled combination plane; the other, holds blades side by side in two 6" long rows.

Our combination plane will accept the right-hand (and unhanded) blades available with the Veritas Small Plow Plane, as well as the blades used with the Stanley #45 and most of those used with the Stanley #55. We also offer an all-new assortment of blades to create a variety of decorative profiles.

Box for combination plane

Blade box

Combination plane blades

KMS Tools and Equipment

Best Value Guaranteed

Shop eFlyer | Hot Deals | Shop Clearance

Search For | Go

Join the KMS Club... It's FREE! Enter email here | Join

Featured Products

ESAB 'Rebel' 215ic Multi Process Welder +$125 Manufacturer Rebate & Free Grinder	Magnum Auto-Darkening Fixed Shade Welding Helmet (Black)	Makita 2pc Drill Driver / Impact Driver Combo Kit	Watson Pipeliner Welding Gloves
			
ESAB-EMP215IC	MAG-WHAFIXEDBLA	MAK-DLX2141SY	WG-2756R
~~$3,399.00~~ $1,999.00	~~$79.99~~ $39.95	~~$399.00~~ $199.95	~~$8.99~~ $4.95
Save $400	Save 50%	Save $100	Save 44%
ADD TO CART	ADD TO CART	ADD TO CART	ADD TO CART
✓ In Stock Online	✓ In Stock Online	✓ In Stock Online	✓ In Stock Online

Featured Blog Posts