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OPTIONS**

FEBRUARY/MARCH 2017
ISSUE #106

CANADIAN **Woodworking** & HOME IMPROVEMENT

**Make an Elliptical
End Table**

p.28

**8
Flooring
Options**

p.23

**How to Add a
Window
to Your Home**

p.36

GO GREEN

**Build an
Indoor
Drying Rack**

p.52

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FEATURES

23 Flooring Options

BY CARL DUGUAY

In this issue's 'Home In On' column we take a look at the many different types of flooring options on the market today.

28 Build an Elliptical End Table

BY DAVID BEDROSIAN

Though not as easy to build as its rectangular cousin, this elliptical table excels at style and grace.

36 Plan, Frame, and Install a New Window

BY ALLAN BRITNELL

If you're unhappy with the amount of sunlight you're getting inside your home, this article will help cast some light on what it takes to add a new window.

44 Friendly Finishes

Learn all there is to know about the healthy, and environmentally friendly, clear-coat finishes available to woodworkers and DIY'ers. BY MARK SALUSBURY

DEPARTMENTS

4 Editor's Letter

6 Letters

8 Web Shavings

10 Home Page

12 Know Your Tools:
Drills

14 Top 10: [Get the Most From Your Cordless Drill](#)

16 Community:
[Camosun College Exhibition on Chairs](#)

18 Canadian Quotes: [Trent Watts](#)

20 Finishing Touch: [Sandpaper](#)

40 Smart Home: [Smart Locks](#)

60 Wood Chuckle

Back Cover: ["Manitoba Maple Vase" Trent Watts](#)

COVER STORY

Cover photo by Rob Brown

52 Craft a Clothes-Drying Rack

With the environment and energy costs getting so much attention these days, you'll love this cheap and efficient drying rack. BY ROB BROWN

23

Photo: Armstrong Floors

28

18

52

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- ▶ Noise 86dB
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- ▶ Main Motor: 3/4 HP, 110V, 60 HZ, 5.3 Amps
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- ▶ Static Pressure: 7" H2O
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CRAFTEX CX-SERIES

2 HP Cyclone Dust Collector

- ▶ Motor: 2HP, 220V, 1 PH, 60Hz
- ▶ 9 Amps
- ▶ Motor Speed: 3450 RPM
- ▶ Suction Capacity: 1450 CFM
- ▶ Static Pressure: 10.5" H2O
- ▶ Noise Level at 36": 76 Db
- ▶ Impeller Size: 14.5"
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editor's letter

I think this is the best time of the year to be spending time in the workshop. Not only is it too dark and cold to be spending much time outdoors, but after the holidays it's nice to spend some quality alone-time working on that project you've been kept from for the past few months.

If, for some strange miracle, you don't have a project on the go, we have a few in this issue to choose from. David Bedrosian details how he built a nice elliptical cherry end table. Though you won't finish it in a weekend, it's a fun build with some interesting techniques. It's also an impressive looking table – one that you can show off to your friends and family when it's completed. If you're looking for a simpler project you should check out the indoor clothes drying rack I made once it started to get cooler out last fall. It looks small, but it holds a full load of laundry with lots of room to spare. Not only is it quite easy to build, but it will save you energy costs for years to come. What's not to like about that?

We have a lot of great stuff in our regular columns, as well. If you've ever wondered what flooring options are available these days, check out our Home In On column. And a look at the smart locks that will help keep your home safe are in this issue too. A great looking Community column shines the spotlight on some recent seating projects by Camosun College students. Carl Duguay continues to look at what it takes to apply a beautiful finish, this time covering sandpaper selection – a crucial step to creating a nice finish.

Speaking of finishing, pro turner and woodworker Mark Salusbury spent the better part of last fall learning about, and experimenting with, what he calls "Friendly Finishes": low or no VOC clear coat finishes that will not only protect and enhance your next project, but will not damage the environment. This is a very comprehensive article, with a lot of information to soak in, but an article that pretty much every woodworker out there can learn something from. There are many products tested in our pages, with even more products and information on our website.

Make yourself a warm beverage, plan which project you're going to build and enjoy your time in the shop this winter.

Rob Brown



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- Drill chuck: 1/4" - 5/8"
- Swing: 33 1/2"
- Max. head swivel: 360°
- Table tilts: 90° left & right
- Table: 12 3/16" diameter
- Overall height: 64 1/2"
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- Distance between centers: 16 1/2"
- Variable speeds (650-3800 RPM)
- Tool rest width: 5 7/8"
- Spindle size: 1" x 8 TPI RH
- Spindle and tailstock taper: MT#2
- Overall dimensions: 38 3/4" W x 12" D x 17" H
- Approx. shipping weight: 89 lbs.



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- Footprint: 21 1/2" W x 20" L
- Arbor: 3/4"
- Arbor speed: 3850 RPM
- Capacity @ 90°: 3 1/4"
- Capacity @ 45°: 2 3/16"
- Rip capacity: 30" right, 12" left
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- Knife size: 13" x 1/2" x 1/16"
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- Spindle travel: 3"
- 2 interchangeable spindles: 1/2" and 3/4"
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letters

Not funny, Don

Hello,

I bought my first copy of the *CW&HI* magazine last week and have a comment about the Wood Chuckle article. I'm a little disappointed about referencing the wife as "What's-her-name" and making referenced to her cooking and what not. I'm not trying to push a view - you just can't be saying that anymore. Dumb, clueless woman who does her best work in the kitchen?? Come on now. Why would you want to alienate half your readers like that? If the author has nothing to write about, scrap the article. Add an actual home improvement article, or something that actually reflects the magazine. I get that it's a humour article, but potty mouth dumb jokes are only good for so long.

Other than that, really enjoyed the magazine and some of the projects.

Thanks

Raymond M.

Via email

Raymond,

Thank you for your email and feedback. I'm sorry that you take offence at Don's humour - his articles receive as much (or more) feedback than any other articles - with about 98% loving them, and about 2% taking issue.

After reading your note though, I have suggested to my editor that we ask our readers outright to comment on Don's article, so that we can see exactly what people are thinking. All of Don's articles can be read here - www.canadianwoodworking.com/author/don-wilkinson - Paul Fulcher, Publisher *CW&HI*

Love your column, Don!

Hi Don,

I am finally getting around to letting you know how much my husband and I enjoy reading your stories. I always get settled somewhere comfy to be ready to be entertained, and am never disappointed. We are both really enjoying your latest series about your neighbour, Carl. I think we've met people very similar to him over the years. Your humorous telling of his/your projects brings us to laughter and reminiscing, so thank you for that.

Keep the stories coming!

Leona L

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Great tool review

Carl,

I have to applaud you for your review of the Bosch Starlock Oscillating Multi-tool. Your review is one of (if not the) most in-depth reviews I've seen since we announced the Starlock products.

Thanks for your work!

Andy Ambrosius

Media Relations Manager, Bosch

See all of Carl's reviews:

www.canadianwoodworking.com/reviews



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2HP Dust Collector with Canister

The CX400 is one of Busy Bee Tools and Canada's best selling dust collectors! Complete with steel arm and 1 micron canister, this dust collector is ideal for medium to large shops. With a powerful 2HP motor and a 1700 CFM rating, this will handle what you throw at it. The included canister is made from a spun-bond polyester which has six times the filtering area versus standard cloth bags and filters dust particles down to 1 micron. Complete with an attractive two-tone powder coated finish and a 3-year warranty, this is a great addition to any workshop. Visit www.busybeetools.com for more information.



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Niagara Falls, ON

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April 8, 2017
Kingston, ON
www.kwoodartca.wordpress.com

Best Build

Check out the **Woodworking** section of our forum for our latest "Best Build" thread – a timber frame outhouse. This month's winner, Brent Stanley, receives a **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**.

New Products



RIDGID 12V Palm Driver Kit



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View more new products at: canadianwoodworking.com/woodworking-news

Free Plan

Mahogany Secretary Desk

This traditional secretary desk will be a cherished family heirloom for decades to come. Visit the "Free Plan" section, under the "Resources" tab on our website to view this and many other plans.



Video Links

www.canadianwoodworking.com/videos

The New X-Carve 3D Carving Machine

Dry Brush Wood Staining Tutorial



Canadians Building Together – Pallet Challenge

This past October we held another of our "Canadians Building Together" events, which centered around using pallet material to create a project. To view some of the projects that were completed, visit the "Special Topics" section, under the "Woodworking" tab on our forum.

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Forum Thread

Engineered Hardwood Flooring?

ShoestringMariner – Guelph, ON

I want to replace all the flooring in my upstairs, halls, living and dining room. I've used laminate with mixed success in the past. Solid hardwood may be costly – would engineered hardwood would be a better choice? I have pets, so a perfect, shimmering floor is never going to happen. Which would you suggest I go with?

StephenL – London, ON

Laminates have come a long way, in terms of durability.

nnieman – Cavan, ON

Engineered hardwood is basically a thin layer of hardwood glued to plywood. I would go with real hardwood, as you can refinish it many times. If you have dogs stick to oak, ash and hickory. Be careful with maple, and know exactly what you're getting.

Brad805

An engineered flooring like Mirage has a 5mm thick wear surface. It can be re-sanded 3 - 5 times. A quality engineered hardwood tends to cost more, but you will find you can get it in greater widths for a variety of reasons. Another common reason to use engineered flooring is it is thinner and that helps deal with problems like dishwasher clearances and rise differences around stairs.

ShoestringMariner – Guelph, ON

Isn't maple similar to ash and oak in terms of hardness?

nnieman – Cavan, ON

Hard maple is good. I've seen lots of flooring sold as "maple hardwood flooring" that is soft maple, and it does not hold up well with kids and dogs.

Also, check out these home improvement threads at forum.canadianwoodworking.com

- Shop Lighting - How Much Is Enough?
- Creating a Legal Basement Apartment

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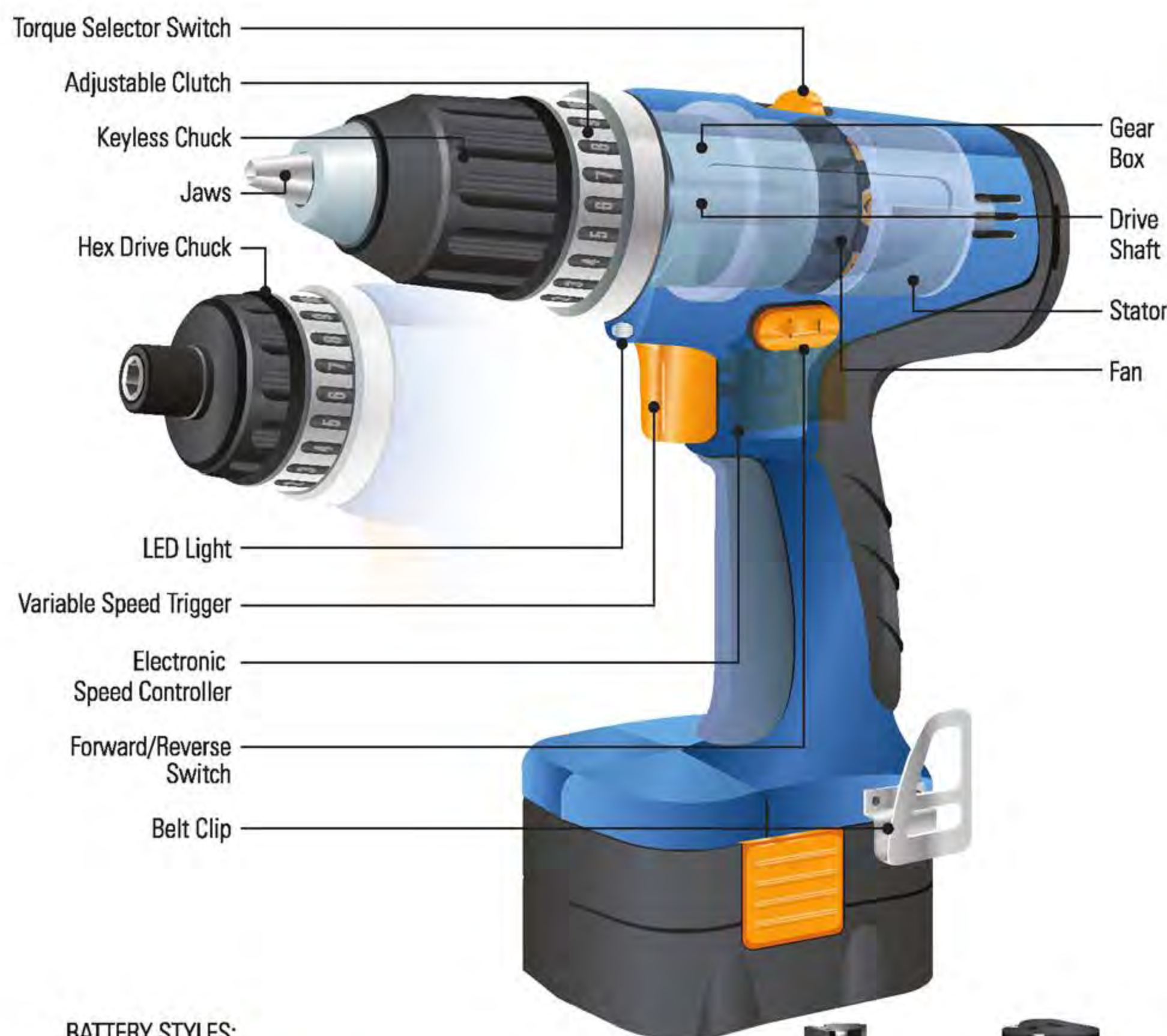


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Cordless Drill/Drivers



BATTERY STYLES:



Slide-on



Compact Slide-on



Clip-on



Slide-in

Compact drill/drivers provide ample power for most day-to-day drilling and screwing tasks, making them ideal for DIYers, hobbyist woodworker, furniture makers, and trades people who primarily drill smaller diameter holes (under 1"), sink shorter screws (under 2-1/2"), and tighten smaller nuts and bolts. These drills typically use a 12V battery platform and feature 3/8" keyless or 1/4" hex chucks, and dual speed ranges with a 1,500 RPM upper limit. Heavy-duty drill/drivers, which usually use batteries that are at least 18V, are the better choice for renovation and construction work. They're more durable, provide greater power, speed, torque and run-time. Premium features include all-metal gear trains, die-cast gear housing, electronic torque setting, and carbide chuck jaws.

Price: \$50 - \$500 (Tool + Battery)
\$120 - \$500 (Kit)

Weight: 1.6 - 4.6 pounds

Battery Platform: 12V, 18V

Chuck: Keyless; 1/4" Hex

Speed: 0 - 4,000 RPM

Torque: 100 - 900 in-lbs

We Recommend:

It's usually more economical to buy a drill/driver kit that consists of one or two batteries and charger. Opt for a lithium-ion battery and brushless motor. If the vast majority of work you do is small-scale, and you rarely need a lot of power, opt for a compact drill/driver, as it will be easier to manipulate, and less expensive.

Get the Most Out of Your Cordless Drill/Driver

Choose the Right Speed

Most drill/drivers have two speeds. Choose setting 1 (low speed/high torque) for driving screws and setting nuts. Use setting 2 (high speed/low torque) for drilling and countersinking.

Adjust the Clutch

The clutch collar has settings from 1 to around 20. The higher the number, the higher the torque. Adjust the clutch to prevent screws from being driven too deep. There is also a drill setting, which disengages the clutch when boring holes.

Feather the Trigger

When setting screws, particularly in thin stock, or when you want to align the screw heads uniformly, try feathering the trigger to rotate the bit in small increments.

Replace Dull Bits

You'll reduce frustration, and drill cleaner holes faster with sharp drill bits. The same goes for your countersinks, counterbores, and plug cutters.

Get a Second Battery

If your drill comes with a single battery, buy a second. You'll always have a fresh power supply ready to go.

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topten

Top 10 Ways to get the Most from your Cordless Drill

Cordless drills are ubiquitous, but not everyone uses them correctly. Here are 10 ways to extend the life of your drill and get it to perform better.

BY ROB BROWN

1 Understand and use the torque selector switch – While using the 'Low' setting, the chuck rotates slower when the trigger is completely pulled, but with more torque. The 'High' setting is used when there is less resistance from the drilling/driving operation, and you want a higher chuck RPM. I usually use the High setting and feather the trigger, and only switch to the Low setting when required.

2 Understand and use the clutch – The clutch tells the drill how much maximum power to transfer into the chuck, and will stop transferring power to the chuck if too much resistance is met. If you want to drive a series of small screws into soft material without sinking the screw head below the surface it's a good idea to use a very low chuck setting. If you're driving large screws, or are drilling holes, use the highest setting, often marked with a twist drill bit.

3 Purchase the right size/power of drill – If you're building small projects a big, powerful drill is going to be hard to manipulate, will cost more money and may even ruin the odd project if it's not used with great care. On the other hand, a small cordless drill will die a fast death if it's asked to do too much.

4 Don't be afraid to put down your cordless drill – Some tasks are too much for the average cordless drill. If you're drilling multiple, larger holes you're likely much better off using your corded drill or drill press.



5 Use quality driver bits – When driving screws my anger reaches a peak when the driver bit I'm using doesn't grip the screw properly. Sometimes it's because of cheap screws or not driving straight into the screw, but usually the culprit is a poor driver bit. Pitch any of your bits that don't work well. Life is too short for poor driver bits.

6 Store drills for easy access – I used to store my five cordless drills in a jumbled bunch on a worksurface. Needless to say, this added to the frustration in my day, and the damage done to my drills. Some sort of storage rack or shelf works wonders when it comes to organization.

7 Secure chargers for easy access and battery removal – Pulling batteries out of a charger is much easier if the charger is secured to something. It's a little, but handy, thing.

8 Keep all drilling/boring accessories nearby in a single spot – To reduce frustration, and wasted time searching, I have almost all my drilling and driving accessories next to where I store my drills.

9 Don't leave batteries in charger for long periods of time – Some chargers shut off when the battery is charged, but many don't. Make a habit of removing your battery from the charger at the end of the day. Using your battery regularly also extends its life.

10 Charge and Recharge properly – Charge completely, and don't over-drain your batteries. Leave the battery in charger until it's 100% full, and remove from drill as soon as you notice a reduction in power.

Were any important tips left off this list? Share your thoughts at the end of this article, on our website.

ROB BROWN

rbrown@canadianwoodworking.com



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Melanie Rush A Curved Connection Western Maple

"I wanted the experience of creating and joining curves so I designed a lounge chair that was predominately composed of curves."



Elaine Waring Geometric Womb Chair Western Maple, Walnut

"The overall shape of this chair was inspired by the 'Womb Chair' designed by Eero Saarinen in 1948. The geometric panels were all assembled without the use of clamps."

Chairisma: Seating in Western Maple

Camosun College, on Vancouver Island, recently put on an exhibition of chairs made by students. Influenced by everything from modern masters to historical icons, these chairs mix materials, styles and approaches to furniture design.

BY ROB BROWN



Ian Walsh A very small, brightly coloured American bird that has wings that beat very fast. Western Maple, African Mahogany.

"This bench is made of three separate torsion box constructions. The seat is made to detach for transport purposes."

Natalia Guzmán-Silva Silla #1 (uno) Western Maple, Black Walnut

"Inspired by the chaise longue, this chair is composed of 346 pieces glued together, shaped and sanded to a smooth surface. The legs can be removed and folded for easy shipping."



Douglas Dokis 100 L.L. Western Maple

"The influences for this chair design were Italian designer Carlo Molino and American chair maker Sam Maloof. I aimed to combine their styles to create a chair that has a late '60s sports-car look."

Ruth A. Spohn Whiskey or Wine

Western Maple, Walnut veneer, Leather

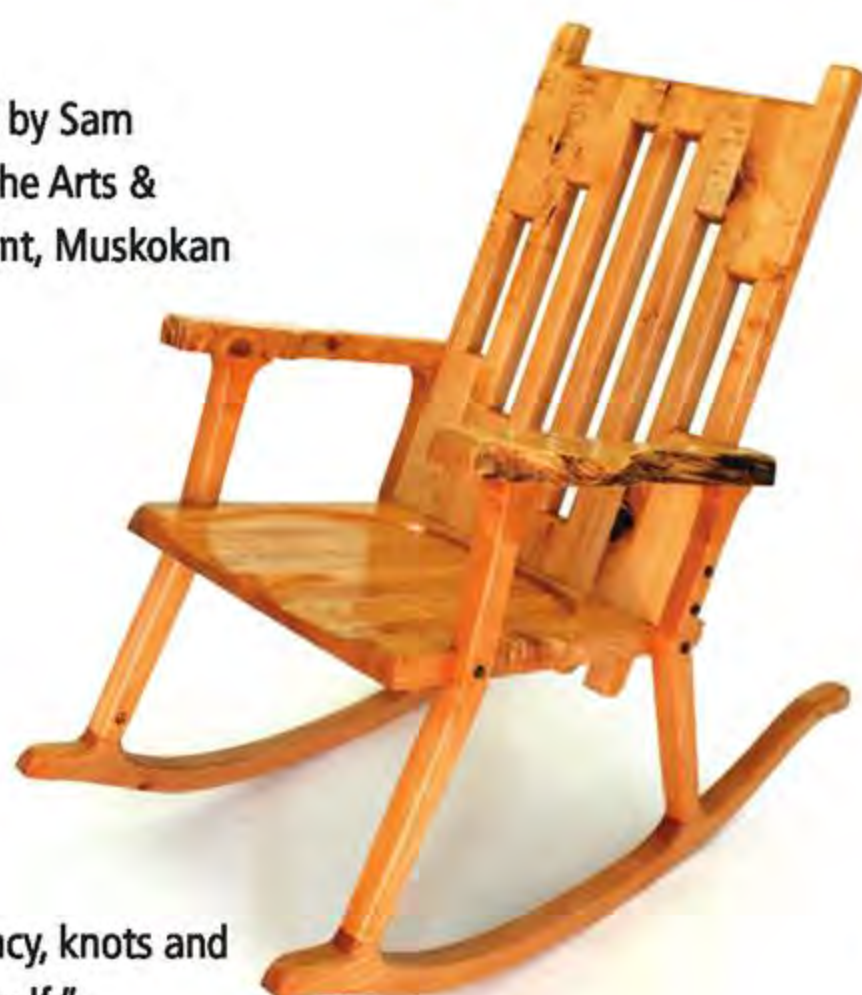
"While designing my chair, I was inspired by both traditional styles and the secondary lines found in Sam Maloof's chairs."



Emily K. Ibsen Stormy Maple

Western Maple

"This chair was inspired by Sam Maloof's rocking chair, the Arts & Crafts elongated box joint, Muskoka summers and Fibonacci's golden ratio. I incorporated Maloof's joinery and contrasting plug details with Phi (ϕ) proportions and Fibonacci numbers while allowing the Western Maple's intricate figure, chatoyancy, knots and live edge to speak for itself."



Brennan Wierzbica Gnome Chair

Western Maple, Garry Oak

"I made this chair with aspirations of simplicity and honesty. I drew inspiration from the peasant-built rustic Windsor chairs of old Europe, while also trying to refine and experiment."



Craig McWilliam Bjørn Lænestol

Western Maple, Hemp upholstery

"This chair was designed in the Mid-century Modern style. The name, which translates to "Bear Armchair" is an homage to the Danish influence behind the design."



Yoshi Konomoto Windsor Torii

Western Maple

"This design originated from a 19th century English Windsor chair. I used straight lines and sharp corners to express the Windsor chair form without its characteristic turning and bending. The back of the chair resembles a Torii gate."



Angus deBoth The Barra Chair

Western Maple, Harris Tweed®

"This chair was heavily influenced by Danish design aesthetics and the principles of balance and simplicity."



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ROB BROWN

rbrown@

canadianwoodworking.com

Trent Watts

...on dreaming, building things and cow udders.

BY ROB BROWN



Small Bowl Set – Created for his daughter, Watts ebonized the bowls after he noticed the burning he was applying to the outside of the bowl was visible on the inside, as well.

Trent Watts, 67, www.trentwatts.ca
Location and size of studio — Saskatoon, Sask.,
two-story single-car garage footprint.

Education — 43 years as a veterinarian, now retired. During that time I had opportunities to take courses on woodturning from many different instructors from around the world.

How long have you been building furniture?

I started making things when I was a boy. I grew up on a farm and don't remember a time when I wasn't making something.

What sort of furniture do you specialize in?

Functional and sculptural objects.

Tell us a couple of interesting things about your personal life.

My early years growing up in rural Alberta enabled me to gain an appreciation for nature. Riding horses, watching the migration of birds and doing myriad farm chores all influenced my interest in making objects.

In order, what are the three most important items in your shop apron?

A pencil, a small square and a 6" ruler.

Do you prefer hand tools or power tools?

I use power tools more than hand tools but love it when I use hand tools.

Solid wood or veneer?

Many of the objects I make use local woods but I also love using veneer for a spectacular, outrageous grain pattern.

Figured wood or straight-grain?

Figured for when the design calls for it. Straight-grain for objects that will be textured and coloured.

Inherited Vintage Stanley Sweetheart or fresh-out-of-the-box Veritas?

There is a real feeling of connection when your hand wraps the tang of a family heirloom chisel.

Flowing curve or geometric shapes?

I love the effect of an unmarred flowing curve as it sweeps its magic around the outline of a turned object.

Favourite wood?

I love turning tight-grained boxwood.

Least favourite wood?

One of my love-hate relationships is with Green Ash.

quotes

Tell us a bit about your studio.

I have two studio spaces. The two-story, single-car garage in my back yard is always waiting for me with a full array of woodworking tools. I have been developing my woodworking space for 30 years. I also have a photographic studio about a block away.



In my imagination I have a place for everything and everything in its place. In reality, I rarely get around to cleaning up until the end of a project. I can be driven to distraction when I set a tool down and it takes me 20 minutes to find it again.



It seems my brain is quite unidirectional and is capable of creating havoc with a project if too distracted.



The lathe is a constant source of joy for me.



I mostly get inspiration from the catalogue of forms floating around in my head that have been gleaned from nature.



My most successful pieces cause people to smile. I certainly obtain the most satisfaction when someone picks up something I have made and they experience joy.



Saskatchewan winters provide a time for quiet contemplation and a relatively monochromatic palette of whites and grays.

I dream a lot. Ideas come from places and times when I least expect them.



Just get out and make stuff. You will improve your design aesthetic, your technical skills, your proficiency, and use less creative expletives when you are making your 100th item compared to your first.



There is rarely a project that I complete that I don't see some areas that I could improve upon.



I am constantly amazed at projects I see that were made by craftsmen before electricity was common.



Seeing a walnut-stained coffee table made from MDF with rudimentary joinery leaves me feeling like there is hope for new makers who can tap into a market where people appreciate hand-crafted work.



When my grandchildren request a specific piece of furniture I jump into action and work with them to create the piece. No requests are too outrageous and no colours are refused.



I have had the incredible good fortune to attend the EMMA International Collaboration many times, where artists from around the world gather in the northern boreal forest to collaborate.



"Just an Udder Bowl" – A former prairie veterinarian, Watts has seen many cows in his day. This bowl is inspired by many of his former clients, and gets a lot of laughs.

Michael Hosaluk stands alone as an important influence. His design aesthetic is unparalleled; imagination boundless and technical skills beyond human. Jamie Russell, Don Kondra and Arthur Perlett also stand out as local makers.



Internationally, Graeme Priddle and Lyonel Grant from New Zealand, along with Jean-François Escoulen and Allain Mailland from France. Their innovative use of materials and complex designs leave me shaking my head. Michael Cullen from California makes some of the most beautiful, colourful and thoughtful furniture I have seen.



CNC machines, 3D printers, smartphones and new-generation materials obtained from some passing asteroid will no doubt be the norm for makers of the future. The real novelty will come when someone picks up a plane and makes an 8' long thin curled shaving from the edge of a 2x4 they found in an old house.



The freedom to add textures and colours to wood has opened a whole world of design options.



ROB BROWN

rbrown@canadianwoodworking.com

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RELATED ARTICLES: Saskatchewan Woodworkers' Guild's 2014 Show (Aug/Sept 2014), Canadian Quotes: Jamie Russell (Apr/May 2013).

SLIDESHOW: View a slideshow of Watts' work in the Videos section of our website.

SANDPAPER

A great finish starts with proper sandpaper selection.

BY CARL DUGUAY

It's easy to think that surfaces prepared on jointers and planers are ready for finishing, particularly when working with wood that has a straight grain and a fine, even texture. Surfaces may look and feel quite smooth, but closer inspection almost always reveals the presence of minute grooves, or ripple marks, on the wood's surface. There are also likely to be areas of tearout. While the marks may be very small, they need to be removed in order to ensure a first-class finish. Don't think that machines equipped with segmented (aka helical or spiral) cutterheads do any better – they also produce ripple marks that you will want to remove. The principle here is that machinery (including routers and shapers) are used to dimension your stock, not to prepare surfaces for finishing.

That leaves three methods for surface preparation: sanding, scraping, and hand planing. Sanding is, by far, the most commonly used method, primarily because it's the easiest to learn and the quickest to achieve great results.

Sanding isn't difficult, but it is time consuming. To get the very best finish you need to use the right sanding abrasive in the right sequence, the right way – regardless of whether you're sanding by hand or with power tools. The aim in sanding is to use sandpaper with increasingly finer grits of material to remove surface blemishes and achieve as close to a scratch-free surface as required before applying your chosen

finish. In this article we'll begin by looking at sandpaper. In future articles we'll cover tools and techniques for hand and power sanding.

The material

All sandpaper consists of natural or synthetic abrasive material embedded on a substrate, the backing, which is typically paper, cloth, or film. The abrasive bonded to the substrate is referred to as the grit (or grain). As you rub sandpaper over a wood surface the grit produces a scratch pattern. The finer the grit that is bonded to the sandpaper, the smaller the scratch pattern.

As you sand, the grit breaks down. Some grit fractures into smaller pieces, exposing fresh cutting edges to scratch the wood – a process called friability. Most grits are not friable – they crumble into smaller blunt pieces, so cut more slowly and wear away more quickly.

The backing for paper runs from A-weight (the lightest) to F-weight



Stearated Paper – When sanding oil-based finishes you can use a special lubricated paper to help protect against clogging. The residue can contaminate water-based finishes though.

(the heaviest). The two most common cloth backings are J-weight (light) and X-weight (heavy). A strong backing material won't easily rip or crack as it's bent. In general, the stiffer the backing the less the grit will flex under load, resulting in more aggressive sanding with a more prominent scratch pattern. Thinner backings are typically more flexible, allowing the grit to compensate for the inconsistencies in the surface of the wood, giving a finer scratch pattern. Wet/dry sandpaper has a paper backing impregnated with latex and can be used to wet sand between coats of finish or to rub out the final finish.

Sandpaper can be close-coated – the backing is completely covered with grit, which tends to clog up the sandpaper with dust – or open-coated – gaps are left between the grits, which allows sawdust to gather so the sandpaper doesn't load up as quickly.

In addition, some sandpapers are classified as no-load or lubricated – they've been treated with a stearate coating, a soapy substance that helps prevent clogging, reduces heat build-up, and makes the sandpaper last longer. Of course, the coating will eventually wear off. That coating can also contaminate some finishes, so it's good practice to wipe down wood surfaces after sanding with stearate sandpaper – when applying a waterborne finish it's best to not even use stearate sandpaper on the piece.

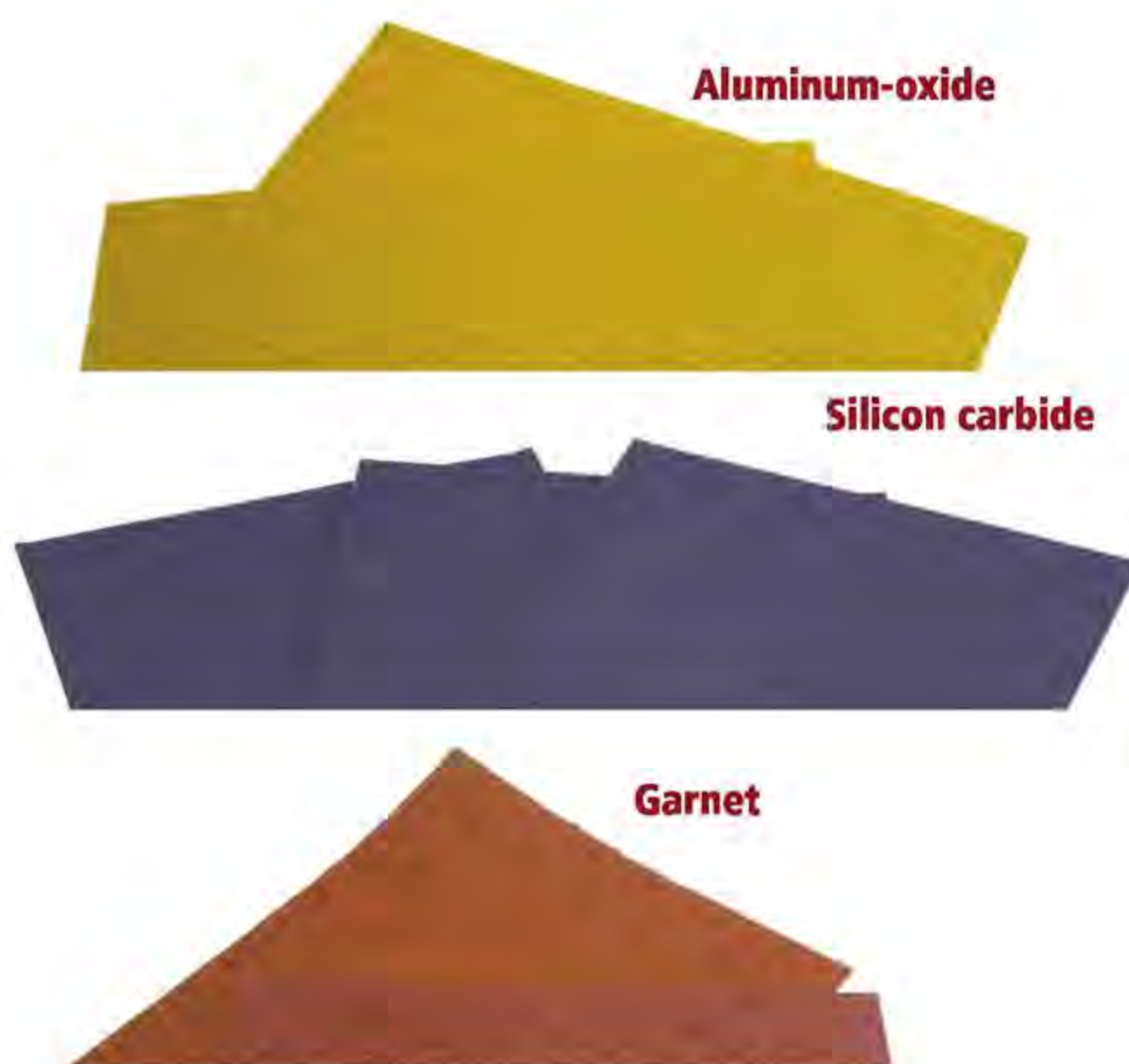
Woodworkers use sandpaper in different formats: sheets, discs, belts, rolls, and pads. Discs are available in two styles for attaching to the backing pad on a power sander. PSA (Pressure Sensitive Adhesive) discs use an adhesive while hook & loop discs use a Velcro system. Hook & loop discs are far quicker and easier to use. Sponges, made with open-coat aluminum-oxide grit, come in various shapes, and are ideal for sanding curved work, profiles, and intricate shapes.

The four basic types of grit

Aluminum-oxide (AIO) grit is the most widely used abrasive material. The grit comes in various grades with the better quality being more friable. As the grits break down they retain their sharpness so the sandpaper cuts quicker, doesn't load-up as quickly, and lasts longer than most other sandpapers. In use, the grit becomes smaller in size, producing a somewhat finer scratch pattern. Grit sizes range from about 40 to 800, and it's available in all the common formats.

Silicon carbide (SC) grit, also referred to as carborundum, is harder than AIO, but not as durable. Under pressure it tends to wear down quickly. However, it cuts more rapidly and produces a uniform scratch pattern. It also has a waterproof backing. SC is typically used in finer grits for smoothing a finish between coats and for rubbing out film finishes, where lighter sanding pressure is applied. It's generally available in grits 220 and above, in sheet format.

Garnet is the granddaddy of sandpaper grits. It's a natural grit with hard, sharp edges that aren't friable, but crumble in use, which tends to burnish the wood surface. It wears more quickly and has a greater tendency to clog up than AIO, and is bonded to a stiff paper backing that breaks easily when folded. However, it does produce a smooth finish, and is about 50% less expensive than AIO, which still makes it a popular choice among woodworkers. Garnet is typically available in sheet form up to 220-grit.



Ceramic grit, in the form of alumina zirconia and ceramic aluminum oxide, are very tough, sharp, and long-wearing. The grit is friable, but much less so under hand pressure. More expensive than other grits, they're generally available in belt and disc formats from 36 to 120-grit, and used primarily for power sanding.

A few recommendations

There are quite a few brands of sandpaper on the market. Most brands can be purchased in singles or small packs, either sheets or discs, which makes it convenient and economical to try the various products so you can hone in on the ones that do the job for you. While some brands, such as 3M, Mirka, and SIA, manufacture their own sandpaper, others offer generic products, often manufactured offshore. As well, both Festool and Bosch market their own line of sandpaper.

The products I particularly like for general sanding by hand and power tool are Norton's ProSand and Mirka Gold, both available in sheets and discs up to about 800-grit (sheets) and 400-grit (discs). These stearated AIO sandpapers have strong, flexible backings, don't wear out too quickly, and don't overly clog-up with dust. The ProSand discs are covered with tiny holes that really help with dust extraction. Another good choice is 3M's No-Load Sandpaper, with an open-coat, stearated AIO coating in sheets up to 800-grit.

For sanding contoured shapes, narrow grooves, detail work and the like, I use 3M Ultra-Flexible Sanding Sheets.





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These have AIO grit bonded to a super thin film, making them extremely pliable. They're available in sheets from 100 to 320-grit.

Another option that I'm using a lot more frequently is the Mirka Abranet discs. They use an AIO grit on a strong, flexible polyamide nylon fabric mesh backing. They cut very fast, are long lasting, and the mesh backing provides superior dust extraction. The discs are available in grit sizes up to 1000-grit.

Brands

3M.com
GatorFinishing.com
Klingspor.com
Mirka.com
NortonAbrasives.com
SiaAbrasives.com

Sources/Brands

HomeHardware.com (Benchmark)
KMSTools.com (Klingspor, SIA)
LeeValley.com (3M, Norton)
TaskTools.com (Generic brand)
WoodEssence.com (Mirka)



Tool Manufacturers – Some manufacturers, like Festool and Bosch, have created their own line of sandpaper that works nicely with their sanders.

UAMA or FEPA?



Sandpaper is classified primarily by the type of grit and the size of the grit. There are two common standards for classifying grit sizes – UAMA (United Abrasive Manufacturers Association) and FEPA (Federation of European Producers of Abrasives). UAMA graded sandpaper is printed with the grit size number on the backing, FEPA with a 'P' preceding the grit size (on the backing and sometimes just on the packaging). Sandpaper made in Europe confirms to the FEPA standard. Up to about 220-grit the two classification systems are very similar, otherwise they are not at all comparable. For example, FEPA P1500-grit is approximately equivalent to UAMA 800-grit.

The sequence of grits used will depend on such factors as the prominence of milling marks left after jointing and thickness planing your stock, the grain pattern of the wood being used, and the type of finish that will be applied. In general though, a good place to start is with P80-grit or P100-grit to remove machine milling marks, followed by P150-grit if a film finish is to be applied, and up to P220 for an oil finish. Up to P320 on end grain and blotch-prone woods.



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HomeInOn: Flooring



Floors can take quite a beating, especially in high traffic areas like entrances and kitchens. Choosing the right flooring for the different areas of your home is important for comfort, durability, aesthetic, and financial reasons.

BY CARL DUGUAY

When it comes to flooring there are a multitude of materials to choose from, along with both practical and aesthetic considerations to make. Balancing the functional with the decorative, while staying within a predetermined budget can be somewhat challenging.

In this article we provide you with an overview of what's available on the market, and list some basic features for each type of flooring so you'll be better informed to select the style of flooring that is best suited to your lifestyle and budget.

No one type of flooring is best for the whole home. Rather, the choice of flooring for a room will depend in large part on your family lifestyle, including such considerations as family size, ages of children, presence of pets, how much traffic the different floors are likely to receive, and whether someone in the family has allergies, uses a walker, or a wheelchair. The budget you set will also have an impact on your flooring choices. Rather than thinking in terms of the upfront cost it may be helpful to

look at the cost prorated over the expected life of the flooring. And, don't forget to factor in other improvements that may need to be done, such as replacing baseboards.

In the master bedroom, spare bedroom, and bedrooms for older children, comfort and warmth may be the most important considerations, particularly as these rooms tend to get far less foot traffic than other areas of the home. Good choices are carpeting and solid wood.

In a young child's bedroom durability is likely to be paramount. Other considerations include flooring that is resilient and non-slippery. Vinyl and laminate are good choices here as they are the least expensive floors to install, and can be easily upgraded when the children get older.

In the bathroom a flooring that can better resist intermittent high levels of humidity and spilled water from shower and tub, and isn't overly slippery, will be more critical. Vinyl and clay tile floorings are popular choices, and both can be installed over radiant heating systems.

For entrance ways and kitchens, durability and ease of cleaning are at the top of most lists. Popular choices include

clay tile and linoleum as they're available in a wide variety of colours, patterns, and designs, and they're easy to maintain.

The selection of flooring in living and dining rooms is often based more on aesthetic appeal. Carpeting is still a very popular choice because it's easy to care for, muffles sound, and is high on the comfort meter. Solid and engineered wood are also excellent choices because of their classic good looks, durability, and especially for solid wood – the ability to be refinished multiple times. And, of course, wood flooring enables you to incorporate carpeting in the form of rugs and runners.

DIY or contract

You can save quite a bit on money by installing flooring yourself. Most installers charge by the square foot. If the existing flooring has to be removed, or if the subfloor needs to be repaired or replaced there will also be additional per square foot charges.

Click-lock (aka floating) flooring is, by far, the easiest and quickest to install, and, in many cases, can be placed over most existing flooring. The only power tool you'll likely need is a table or miter saw. Various brands of engineered wood, laminate, linoleum, and vinyl are available in a click-lock format.

While solid wood flooring isn't difficult to install (using staples or flooring cleats), the process is involved, time consuming, hard on the back and knees, and requires patience to get the job done right. You'll need to remove the existing baseboards and reinstall or replace them later. Likely you'll also have to do some trim work around doors, thresholds, floor registers, stairs, and fireplace, and install transitions where the hardwood flooring meets other types of flooring.

Hard floors (tile and stone) are even more arduous and time consuming to install, and unless you know what you're getting into, don't.

If you hire an installer do get several quotes with references. Retailers may be able to provide you with the names of reputable installer – a person whose primary work involves flooring installation – rather than a handyman who may have much more limited installation experience.

What's underneath?

The condition of the subfloor is critical to how your new flooring feels underfoot and how long it lasts. For newer homes this isn't likely to be an issue. But, for older homes (pre 1960's) you'll want to ensure that the subfloors are structurally sound and free of excessive vertical movement or deflection. They also need to be smooth, level, dry, and free of debris. An uneven or rough subfloor is not only likely to telegraph through the new flooring but also result in excessive wear on high spots.

Most types of flooring require an underlayment (padding in the case of carpeting), which goes between the subfloor and the finished flooring. This is especially important for laminate, vinyl, and linoleum flooring, which can be fairly thin. Underlay provides some shock absorption, impact resistance, protection from substrate water vapour (especially when the flooring is placed over concrete), and helps to reduce sound transmission. Some underlays include a moisture or vapour

barrier. Not all flooring uses the same type of underlay. Tile floors, for example, might use a cement board or polyethylene membrane underlay, while laminate flooring use foam, cork, or felt underlays. Make sure you use the underlay recommended by the manufacturer. In all cases, a premium underlay is better value, considering how long those floors will likely be in place.

What's on top?

We've listed eight of the most popular, and widely available floor coverings. Once you've narrowed your selection down to one of two of these categories, you'll want to do more detailed research. Take a look at what's available on manufacturers websites, and visit local flooring retailers to see the products up close. However, the way a product looks in a retail store isn't necessarily the way it's going to look in your home. Fortunately, a lot of retailers will let you take home samples. Don't rush to buy – Canada is, after all, a world leader when it comes to 'specials', 'sales', and 'hot deals'.

We've avoided some of the more esoteric flooring – concrete, brick, steel, cork, bamboo – because of limited market availability, high cost, or difficulty in finding experienced installers. There are some flooring options, such as DuraCeramic, that don't fit exactly into the categories below. This Congoleum product is made from limestone composite fortified with a polymeric resin and needs to be sealed. It's more flexible than ceramic tile, so easier to stand on for longer periods of time, but it's more prone to denting and chipping. It can be installed over concrete and other types of flooring. There is also a newer variant of polyester carpeting called Triexta (aka Sorona) that is considered more resilient and softer than conventional polyester, but not as lustrous.



(Photos by Beaulieu Flooring)

Carpeting: One of the most popular floor coverings because of its warmth and comfort underfoot. Available in a myriad of colours, styles, and textures in both natural and synthetic fibers including wool, nylon, polyester, and polypropylene (aka Olefin). There are a wide variety of styles including berber, saxony, wilton, friese, and cut and loop. Underlay recommended.

Carpet Fibers

Wool: Soft, durable, resilient, and luxurious. Can last a lifetime if properly maintained – which means a professional carpet cleaner experienced in cleaning wool carpets. Stains easily but sensitive to bleach. The most expensive of all fibers.

Nylon: Available in a wide range of styles and colours. Very resilient, durable, resistant to stains (but not bleach), wears well, cleans easily. The most expensive synthetic fiber.

Polypropylene (PP): Also referred to as Olefin. A lightweight fiber with good resistance to abrasion, waterborne stains, and mildew. The least expensive fiber. Oily stains difficult to remove. Less resilient and heat tolerant than other fibers.

Polyester (PET): Resistant to bleaching, waterborne stains, fading, soil dye reactions. Dries quickly. Oily stains difficult to remove.

Cost: \$\$\$

Pros: Soft under foot; helps reduce noise transmission between floors; safer than other flooring against falls; low-VOC emission.

Cons: Requires more maintenance than other flooring options; difficult, if not impossible to repair;

Sources: BeaulieuFlooring.com, DWCarpet.com, KrausFlooring.com, ShawFloors.com, StainMaster.com



Solid Wood: A traditional flooring that exudes character, charm, and warmth. Harder woods are a much better choice than softer woods. Available pre-finished, which offers better durability than finishes applied on-site. Lasts a lifetime as it can be refinished many times. Unlike engineered wood flooring it has to be nailed down.

Cost: \$\$\$

Pros: Wide range of species and colours; reasonably easy to repair; can be refinished; hypoallergenic.

Cons: Can show wear quickly on high traffic areas; susceptible to moisture and denting; time consuming to install and refinish.

Sources: ArmstrongFlooring.com, LauzonFlooring.com, Mercier-Wood-Flooring.com, MirageFloors.com, Pergo.com, Preverco.com



Engineered Wood: Essentially a thin layer of solid wood bonded to one or more layers of structural plywood. Just as many choices as with solid wood. Varies in quality and thickness. Can consist of as few as two layers. Look for a thick wear layer. Economy brands made overseas can contain formaldehyde. Installation options include nailing, stapling, gluing, click-lock (floating). Underlayment recommended. Some can be installed over radiant heating systems.

Cost: \$\$

Pros: Quick and easy to install; some can be installed on concrete; pre-finished; about as durable as solid wood but more dimensionally stable.

Cons: Some can't be refinished, most only once; as with solid wood can dent.

Sources: ArmstrongFlooring.com, LaurentianHardwood.ca, Preverco.com, Mercier-Wood-Flooring.com, MirageFloors.com, LauzonFlooring.com



Vinyl: Also known as Resilient flooring. Made of bonded layers of urethane, vinyl, and fiberglass, with a photographic paper layer. Available in squares, planks, and sheets in a wide variety of colours, patterns, and textures. Installation options include loose lay, peel and stick, click-lock, full gluing, perimeter gluing. Underlayment recommended. Some brands can be very thin, transmitting any imperfections in the subfloor. Can be installed over embedded radiant heating systems.

Cost: \$

Pros: Easy to install; durable; moisture resistant particularly in sheet form; soft under foot; easy to maintain.

Cons: Difficult to repair especially for sheets; seams may show; can be slippery when wet (some come with an anti-slip coating); colours can fade; can contain VOCs; not biodegradable.

Sources: ArmstrongFlooring.com, Congoleum.com, KrausFlooring.com, Mannington.com



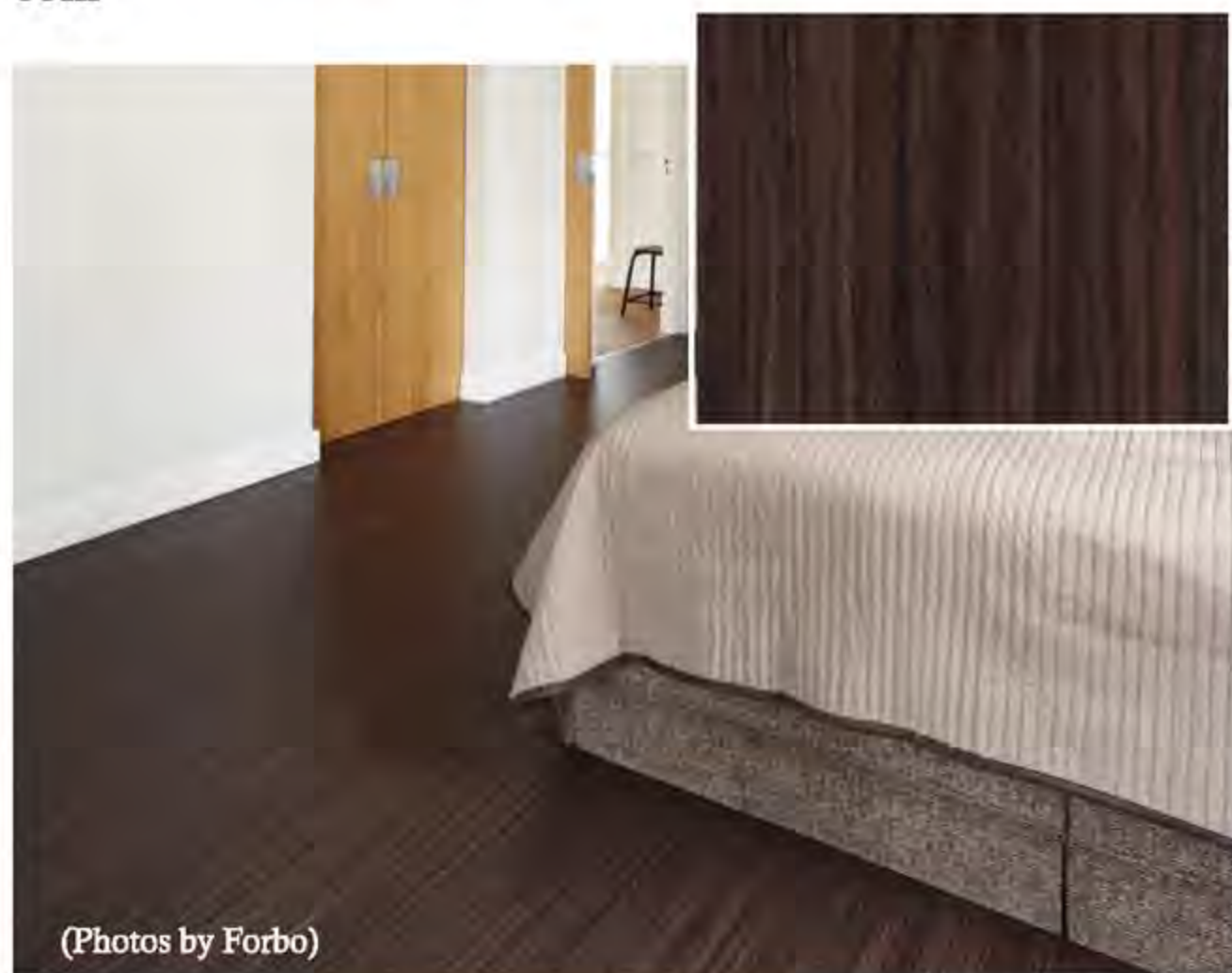
(Photos by Armstrong Flooring)

Cost: \$

Pros: Quick and easy to install; colours don't fade; very durable; reasonably easy to repair; easy to maintain.

Cons: Can't be refinished; susceptible to moisture; hard and unyielding underfoot; can contain formaldehyde though generally VOC-free.

Sources: ArmstrongFlooring.com, KrausFlooring.com, Mannington.com, MonoSerra.com, Pergo.com, TORLYS.com



(Photos by Forbo)

Laminate: Very large choice of colours and patterns that mimic wood and granite. Less aesthetically pleasing than engineered flooring. Consists of multiple built-up layers of plastic, high-density fiberboard, and a photographic paper layer under a clear plastic top-coat. Available in squares, and narrow and wide planks usually installed as a click-lock (floating) floor, in some situations glued. Underlayment recommended. Can be installed over most other flooring. Not for use in bathrooms, laundry rooms, and basements.

Linoleum: Made primarily from natural materials including linseed oil, wood products, and limestone. Comes in sheets and tiles of various sizes in a wide variety of colours and patterns. Installation options include gluing and click-lock. Underlayment recommended. Some brands can be very thin, transmitting any imperfections in the subfloor. It's hypo-allergenic, doesn't off-gas, and is recyclable. Less moisture resistant than vinyl.

Cost: \$\$

Pros: Very durable; antistatic; hypoallergenic; good stain resistance; soft under foot; easy to maintain.

Cons: Difficult to repair; somewhat easy to scratch; cannot be refinished; seams may show; requires regular resealing.

Sources: ArmstrongFlooring.com, Forbo.com



(Photos by Savoia)

Clay Tile: Available in a wide variety of colours, designs, and shapes. Comes in two formats: porcelain and non-porcelain (usually referred to as 'ceramic' tiles). Available in matte, unglazed, or glazed finish. Porcelain is denser and harder, impervious to moisture, and stain resistant. However porcelain is more brittle, making it somewhat prone to breakage when cutting. Glazed ceramic is also moisture and stain resistant, but more prone to wear and chipping than porcelain. Unglazed tiles and grouting require sealing. Brand quality varies and some tiles chip and break more easily.

Cost: \$\$\$

Pros: Durable; stain, scratch, and moisture resistant; hypoallergenic; very easy to maintain; appearance won't fade over time.

Cons: Time consuming to install; more easily chipped or broken if heavy objects dropped on; grout can stain; hard and unyielding underfoot; can be cold and slippery.

Sources: ArmstrongFlooring.com, Cerasec.com, Eurotile.ca, Savoia.com



(Photos by Centura)

Stone: Includes granite, marble, travertine, sandstone, and limestone. Provides the most distinctive and classic appearance as each piece has its own colouring and veining. Not all pieces will be of a uniform thickness. Can be installed over radiant heating systems.

Cost: \$\$\$\$

Pros: Very durable; moisture resistant; appearance won't fade over time; hypoallergenic.

Cons: Time consuming to install; must be periodically re-sealed; more easily chipped or broken if heavy objects dropped on; grout can stain; hard and unyielding underfoot; can be cold and slippery; somewhat higher maintenance needed than other flooring.

Sources: AderaStone.com, Centura.ca, Nufloors.ca

Resources:

Coverings, Canada's Floor Covering Magazine:

CoveringsCanada.ca

The National Wood Flooring

Association: **HardWoodFloorsMag.com**



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Build an Elegant End Table

Templates and jigs are the key to tackling the different curves on this cherry table.

BY DAVID BEDROSIAN

I chose a size of 29" by 21" for the top of this table, but you could scale it up if you want to make a coffee table. I wanted the top to overhang the oval apron by 1-3/4", which meant the outside dimensions of the apron should be 25-1/2" by 17-1/2". To make the apron

sufficiently strong, I made it 1-1/4" thick and 2-5/8" high. The 17" long curved and tapered legs are 1-1/2" square at the top and approximately 1" square at the bottom. I found this leg size to work well for both this end table and larger coffee table.



MDF Templates – Templates are used to shape the top, apron and legs. MDF is a good material to make the templates from, as it can be shaped very smooth.



Glue Half at a Time – Bedrosian uses dominos to glue together the pieces that make up the left and right halves of the middle layer of the apron. Position the dominos so they won't be exposed during final shaping of the apron.

Rout three MDF templates

The 1/2" thick MDF templates for the top and apron can be cut using any of a number of ways, but my preferred method is with a shop-built elliptical router jig.

Make a 1/4" MDF template of the curved face of the leg. Note the upper 2-3/4" of the leg should remain straight and square since that portion will be joined to the apron. It's worth spending a little extra time sanding the edges of the templates since any irregularities will be transferred to the finished pieces.

Build the three-layer apron

The apron is built from three layers of 7/8" poplar, arranged in a brick-layed fashion for maximum strength. Start with the middle layer by cutting the 10 pieces to length and at the correct angles using the drawing of the middle apron layer. Glue the pieces together into a left and a right half using splines or dominos to strengthen the end-grain joints. Make sure the two halves are flat during glue-up. To ensure a tight fit of the left and right sides of the ring, I taped 120-grit sandpaper to the infeed table of my jointer and while the assembly was held



Mind the Gap - Sand the ends on a flat surface such as a jointer table so the left and right halves fit together without a gap. Use the jointer's fence to ensure the apron assembly is at a right angle while sanding.

Rout Flush Using the Template – Mark arrows on the template and use both a flush trim bit and a template bit so you are always routing downhill to avoid tearout.

perpendicular with my jointer's fence, sanded the ends until they were flat.

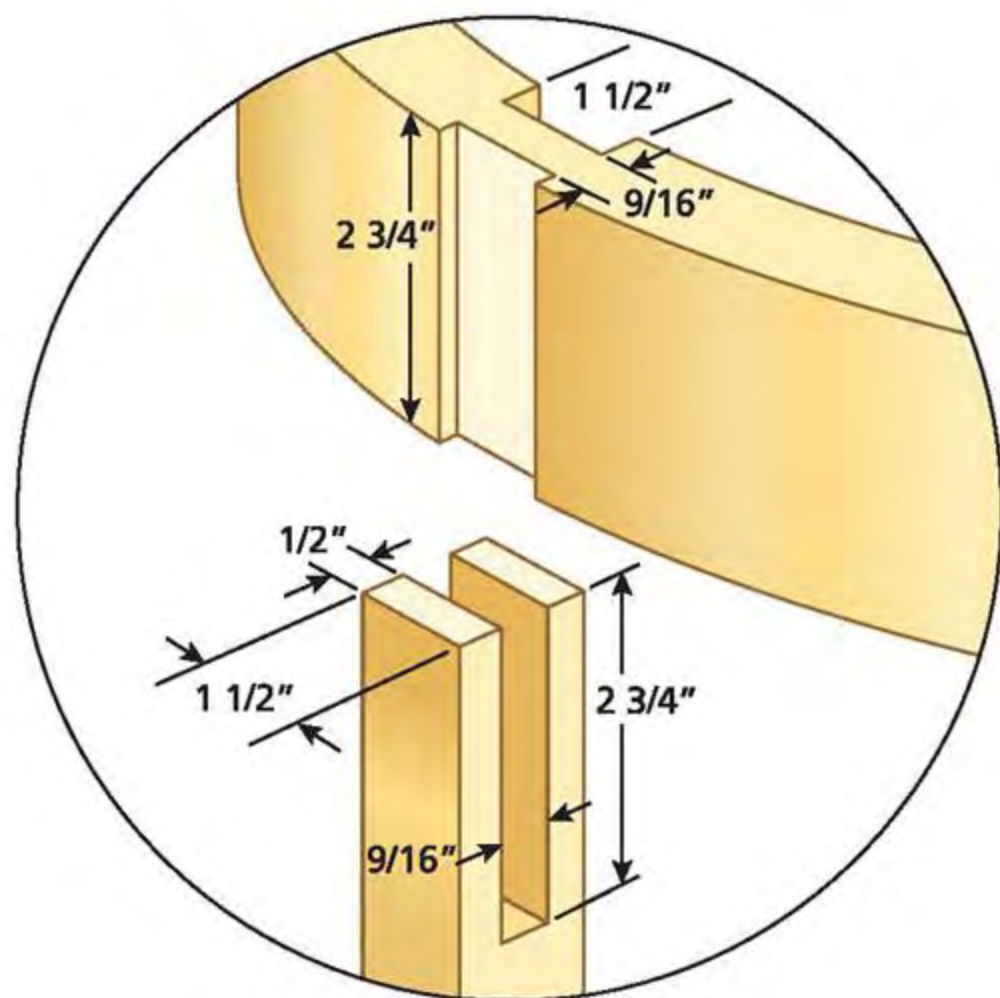
Before gluing these ends together, use the apron template to mark the inside and outside edges on the wood and then bandsaw away most of the waste. You can then use splines or dominos to glue together this middle apron layer. When dry, temporarily fasten the apron template to this layer using small screws so you can rout flush to the template. This middle layer now becomes the template for the top and bottom layers.

Building up the apron with the top and bottom layers is easier. The pieces can be glued directly to the middle layer without requiring splines or dominos to strengthen the end grain joints. Ensure the joints of each layer don't align with a joint in the middle layer. Cut all but one piece per layer using the lengths and angles shown on the drawing of the top and bottom layers of the apron. The final piece will be cut to fit precisely after the other nine pieces are glued in place. To minimize the amount of wood that needs to be routed away, bandsaw each piece close to the finished size before gluing it to the middle ring. Pin nails can be used to hold the pieces while the glue dries, provided you stay away from the location of the legs. Rout away the waste using a flush trim bit with the bearing riding on the middle ring.

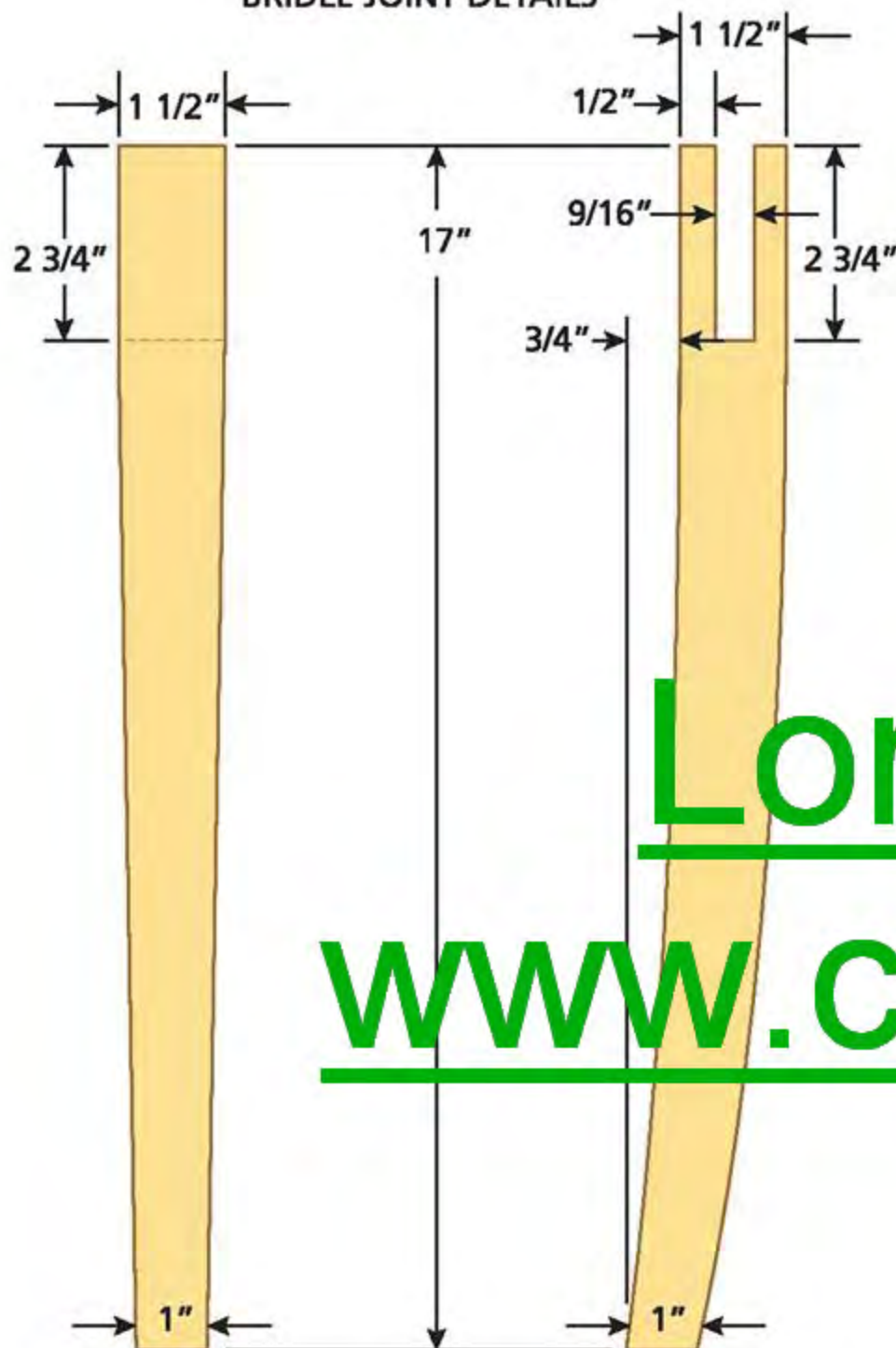
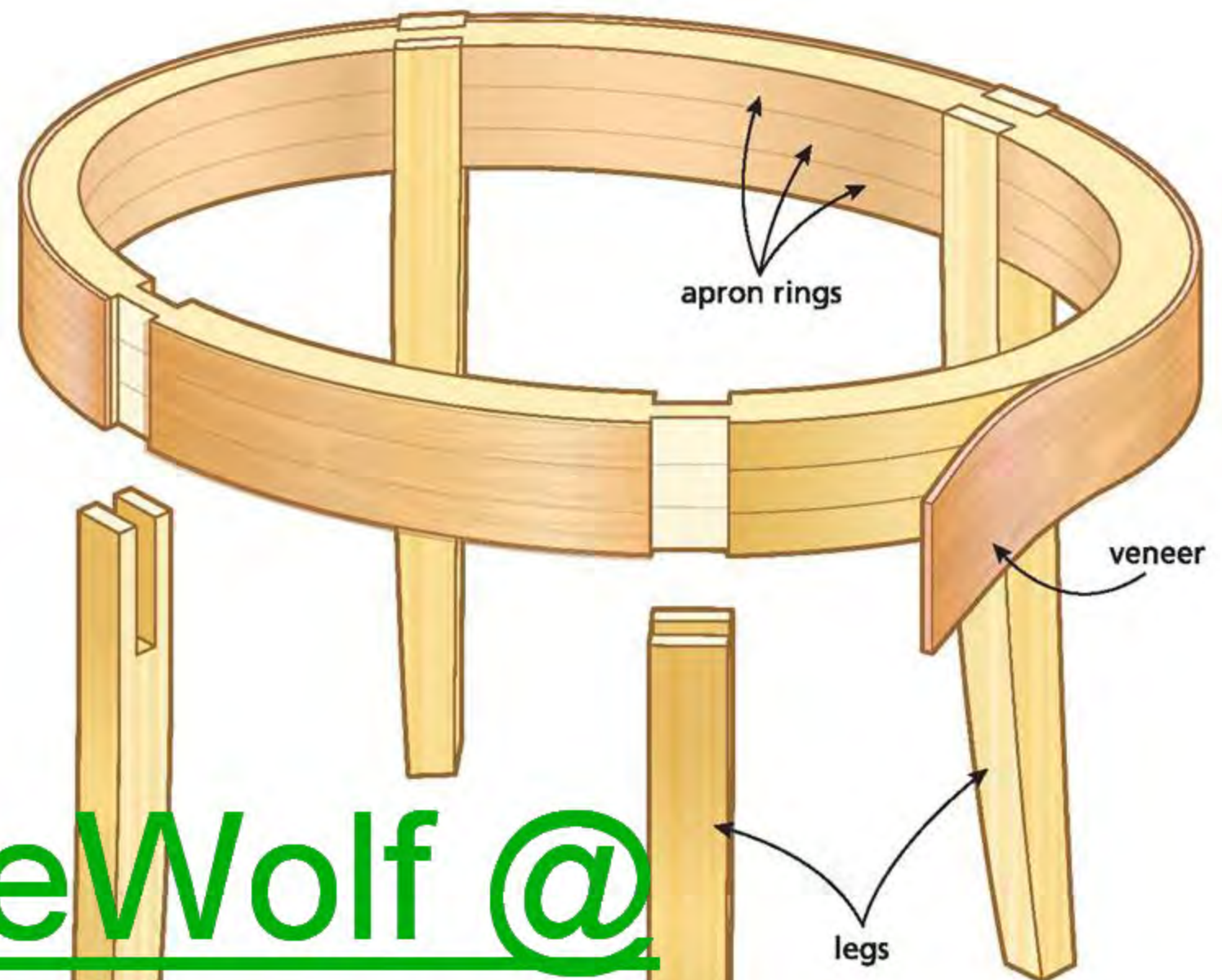
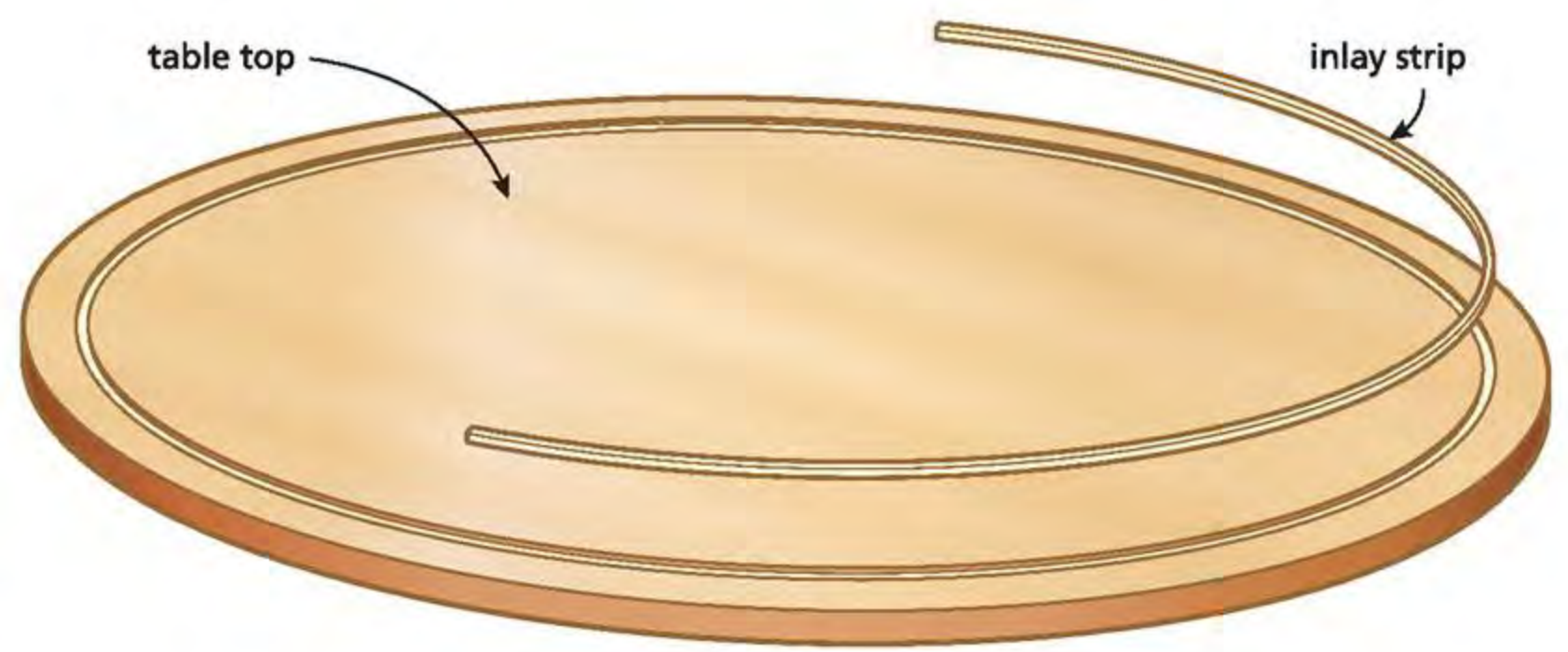
Apply apron veneer

Using commercial veneer for the show face of the apron will work, but I prefer to resaw my own slightly thicker veneer. Use



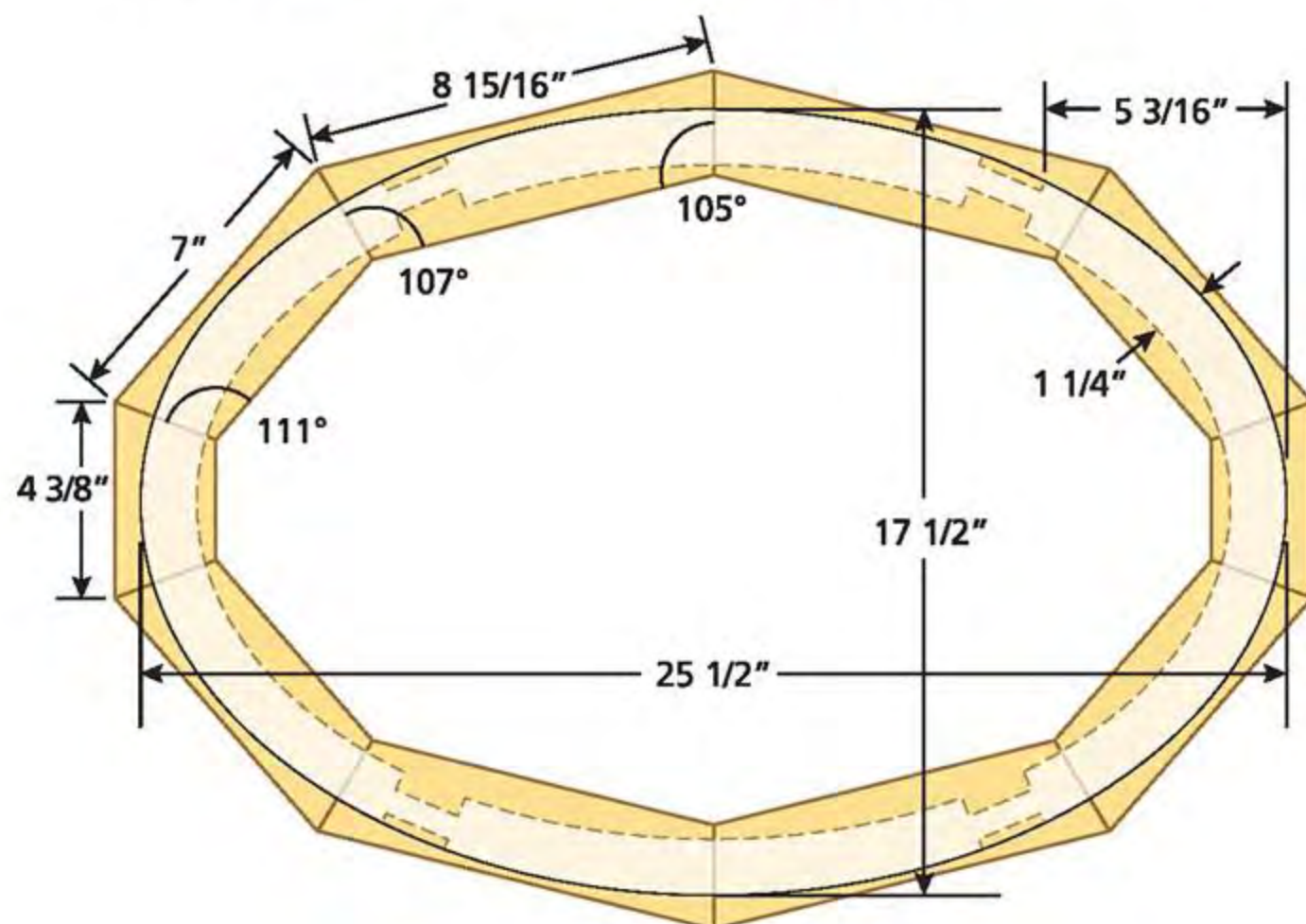


BRIDGE JOINT DETAILS

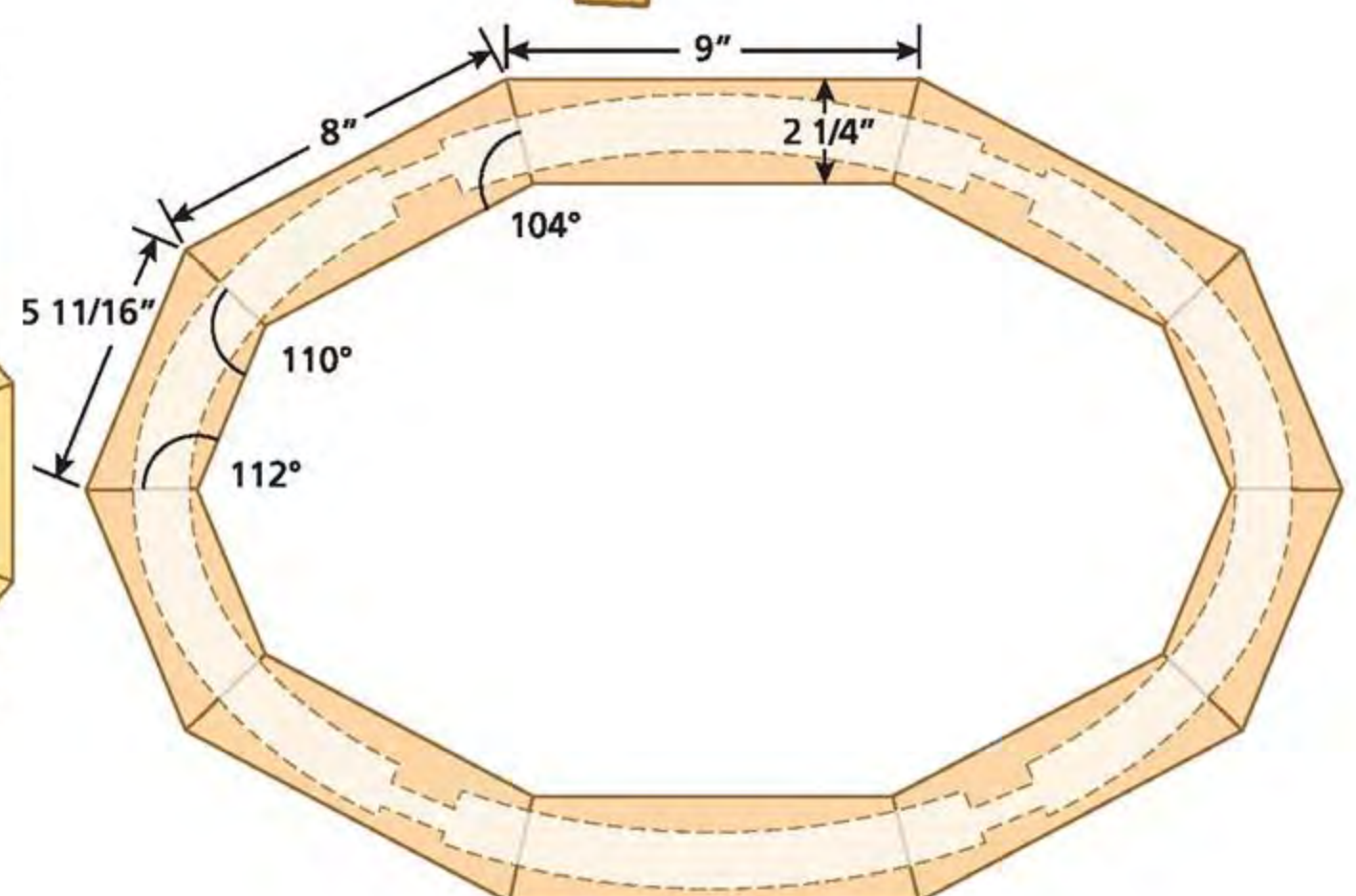


LEG - FRONT VIEW

LEG - SIDE VIEW



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Materials List

Part	Qty	T	W	L	Material
Top	1	7/8	21	29	Cherry
Legs	4	1-1/2	2-1/4	17	Cherry
Apron Board	30	7/8	2-1/4	To Fit	Poplar
Apron Facing	4	1/16	3	To Fit	Cherry



Clamp Around the Curve – Use thin MDF cauls and lots of clamps around the top and the bottom of the apron to pull the veneer tight to the face. Even pressure, without over-tightening each clamp, is key here.

four lengths of veneer, leaving about a 1/2" gap where the legs will be connected. Cut the veneer about 1/4" taller than the apron to allow some play when gluing the veneer. I used three pieces of 1/8" Masonite as clamping cauls and I applied packing tape to the inner caul so it would not stick to any glue squeeze out. Be sure to do a dry run before applying glue to the veneer. You will need quite a few closely spaced clamps on the top and bottom of the apron to ensure the veneer is pulled in tightly to the apron.

Machine the legs

Machine four leg blanks to 1-1/2" by 2-1/4" by 17" long. I used straight grain 8/4 stock. Use the leg template to build a two-sided sled that will securely hold the leg blank so you can rout both faces of the legs. Before routing the outside edge, I placed each leg in the sled and traced a pencil line so that I could remove most of the waste on the

bandsaw. I then routed away the small amount of wood that was left using a template bit riding along the edge of the sled. I did the same thing using the opposite side of the sled for the inside edge of each leg.

The legs are tapered on the sides to a width of 1" at the bottom. Be sure not to taper the upper 2-3/4" of the leg since this portion will fit into the apron, and the sides need to be parallel. I used a tapering

Slot the Top of the Leg – The leg is fastened to the apron using a bridle joint. The slot is cut with multiple passes of a rip blade using spacers to ensure a consistent width for all of the legs.



Rout the Curves on the Legs – The router sled ensures that the curves on all four legs will match the leg template.

jig on my table saw to achieve the look I wanted. Remove any saw marks with a few passes of a hand plane.

The last step for the legs is to cut a slot in the top of the leg equal to the height of the apron. This will form one half of the bridle joint used to join the legs to the apron. Cut the slot using a tenoning jig on the table saw. The slot is too deep for my dado set, so I used my flat top rip blade raised to a height equal to the height of the apron. Rather than making adjustments to the tenoning jig, use different width spacers between the leg and the side of the jig to get the full slot width.





Mark the Leg Positions – Trace the leg width on the top of the apron by aligning the leg and apron, then pressing a 6" rule against the side of the leg.

Taper the Sides of the Legs – Use a taper jig to hold the legs in place as the sides are tapered. The upper few inches of the leg fits into the apron and is not tapered.

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Machine the apron notches

The tenon portion of the bridle joint is formed by routing a shallow opening on the outside face of the apron and a deeper opening on the inside. To hold the router flat on the curved apron, build a router sled with cross supports that straddle the apron and has parallel rails that guide the router so it will cut an opening the exact width of the leg (1-1/2"). I used a plunge router with a router collar so I had to account for the spacing between the collar and the bit to determine the distance between the rails. Make test cuts on a scrap and fine-tune the sled until the leg fits nicely in the routed slot.

Draw two parallel lines on the top of the apron at each leg location by pressing a ruler against the side of the leg as it is held in position. The leg will rock on the curved apron surface so be sure to hold it securely. Use these reference lines to position the router sled on the outside of the apron and clamp it in place. I set my plunge router to cut about 1/8" deep into the apron and routed away the face veneer and slightly into the poplar. Without changing the depth of cut, rout the openings on the face of the apron for the other three legs.

Rout the Outer Notches – The jig Bedrosian uses is made up of two pieces of 3/4" plywood that are fastened together with two parallel rails. First, rout a shallow opening on the outside face of the apron, the exact same width as the top of the leg.



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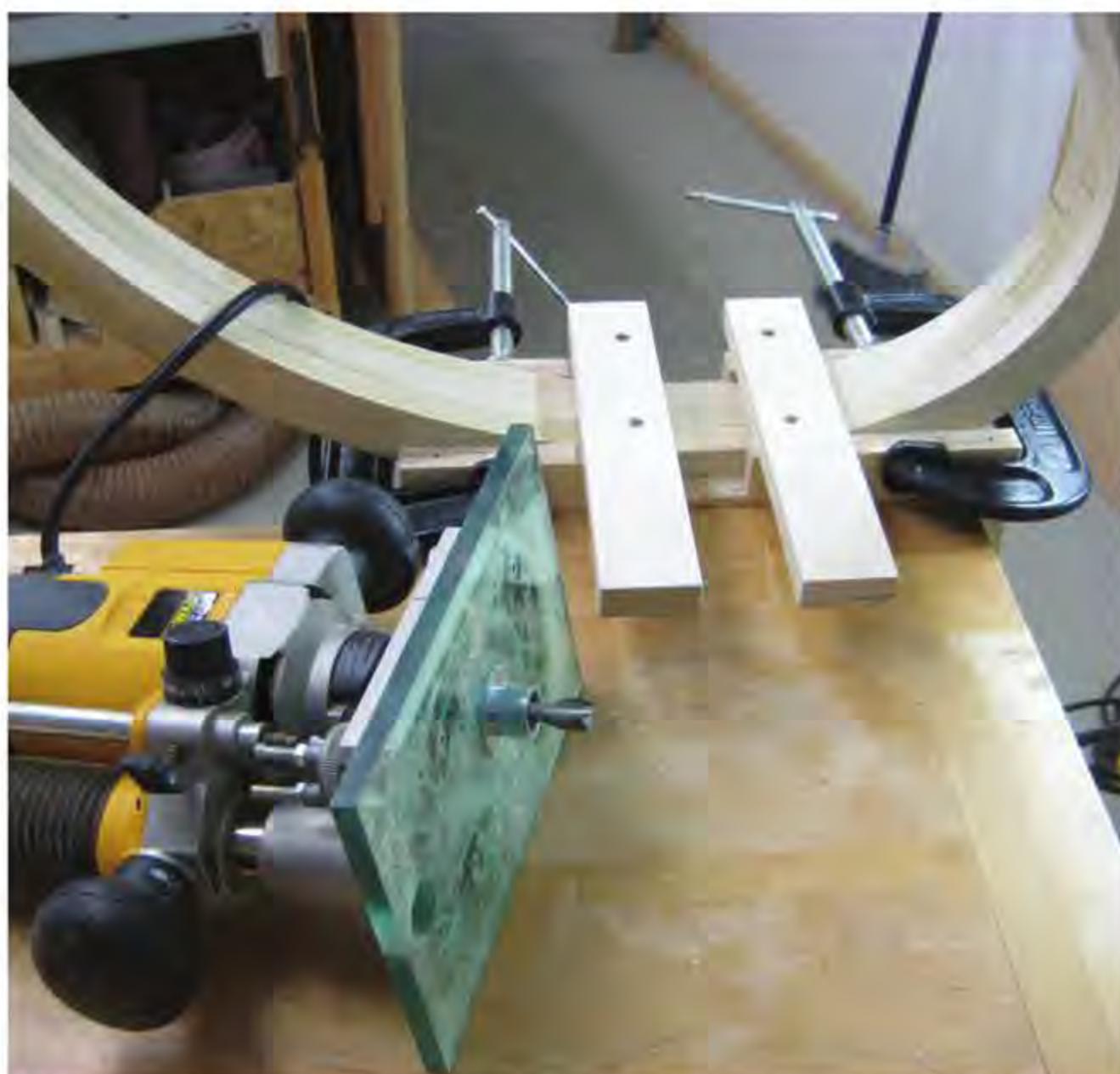
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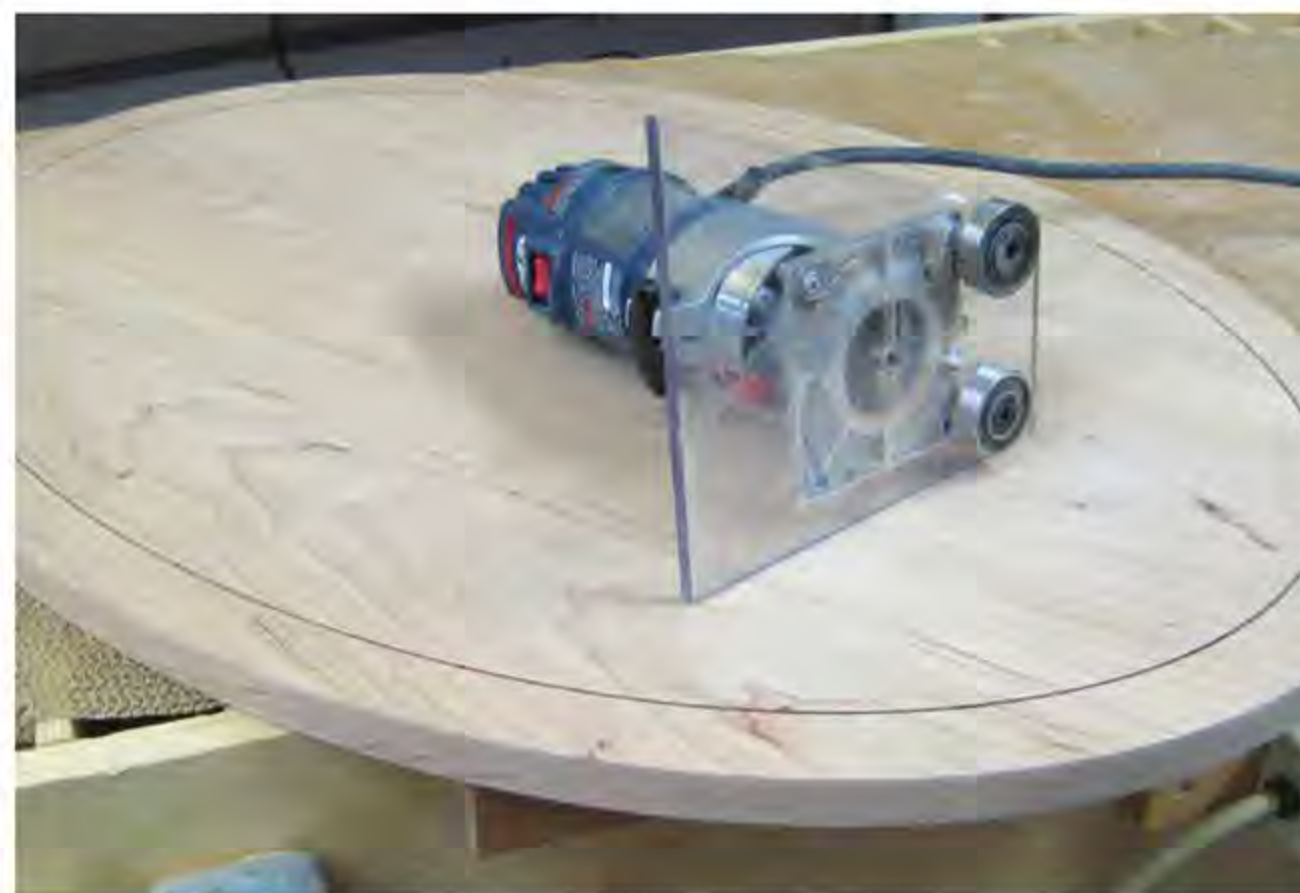
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Rout the Inner Notches – With all four notches machined into the outer surface of the apron, reposition the jig with the layout lines on the inner surface of the apron. The depth of the second notch will create the final thickness of the tenon. When in doubt, leave a little extra material on the tenon and fine-tune the fit with a shoulder plane.

Routing the openings on the inside of the apron is a little trickier since you have to get the jig aligned with the opening on the face of the apron, and you have to adjust the router depth so the tenon will match the slot in the leg. I found it best to leave the tenon a little thick and custom fit each leg with a shoulder plane. You want the leg to fit snugly over the tenon, but not so tight that you have to hammer the leg in place. If the leg twists while it is being inserted, you can widen the opening on the inside of the apron since that part of the joint will not be visible.



Groove for the Inlay – Two bearings on the trim router base ride against the edge of the table top to rout the 1/16" groove for the inlay.

Glue the top from a single board

I sorted through my stock of cherry to find a single board that I could use for the top. This helped to get a consistent grain pattern and colour. After machining to a thickness of about 7/8", glue the top together and sand or handplane the surface flat. Using double stick tape, fasten the MDF template to the workpiece and head to the bandsaw to cut close to the template. I used a combination of a flush trim bit and a template bit to rout the top to the final size, making sure I was always routing downhill.

To give the top a little more character, I inlaid a 1/16" wide strip of maple about 1" from the edge. Cutting the groove for the inlay can be done by hand, but I chose to use my trim router with a shop-made base that has two bearings that ride against the outside edge of the top. Go slowly with this step so that you keep both bearings in contact with the edge. I cut the maple inlay on my bandsaw and then handplaned a slight taper to get a tight fit when glued into the



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Add Inlay – The inlay has slightly tapered edges for a tight fit in the narrow groove. Apply some glue in the cavity, then gently tap the inlay into place. An extra set of hands may come in handy here.

top. As a final step, relieve the underside of the top with a thumbnail router bit taking a number of passes before getting to full depth.

Finish before assembly

I recommend applying the finish to the individual parts of the table before you do the final gluing and assembly. Sand all of the pieces, soften all of the edges and mask off the leg slots and the tenons in the apron. My preferred finish for

cherry is to apply a coat of boiled linseed oil followed about a week later by a few coats of garnet shellac and then several topcoats of polyurethane. The combination of the oil and the shellac gives the cherry a warm glow and the polyurethane gives the protection this table needs for use in a family room.

When the finish has dried, glue the legs in place using epoxy since it will fill any small gaps that may exist in the bridge joints. Leave the table upside down while the epoxy dries so any squeeze-out will not run down the legs. As a final step, fasten the top to the apron allowing for seasonal changes in its width.

DAVID BEDROSIAN
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David is an avid woodworking hobbyist with an ever expanding basement workshop in his Waterloo, ON home. In addition to spending time in his shop, he is also a competitive triathlete.



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WINDOW WISE:

A Guide to Planning, Framing and Installing a New Window

BY ALLAN BRITNELL

Here's a word to add to your vocabulary: fenestration. It's a term used to describe the windows, doors, and other openings in a building. And if you're comfortable using a hammer, saw, and drill, you're likely capable of getting into the home fenestration business. Specifically, adding a new window to your house. If the thought of poking holes in your home's building envelope seems a little too intimidating, the same steps could be used to add natural light to a garage, shed or a bunkie at the cottage.

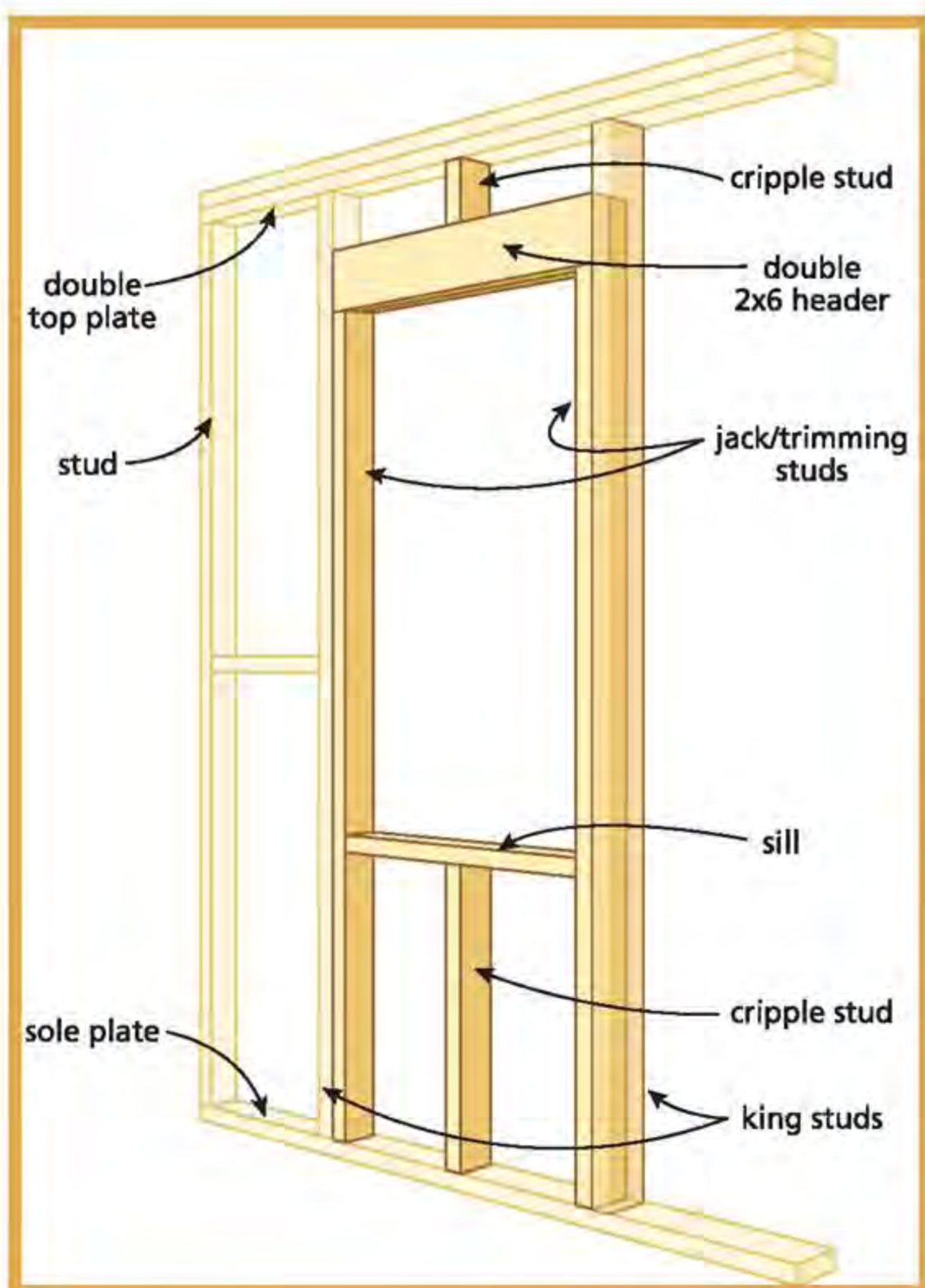
The fine print

Before you start ripping open walls you should contact your local building department. For one, you'll likely need a building permit to add a window. Some municipalities also limit the size and number

of openings you're allowed in a home. If you've decided you want add a large picture window in your dining room to capture the morning light, you may be required to close up an existing window elsewhere in the house to do so. If you are working on an existing wall, you'll need to carefully remove the vapour barrier and insulation, and reinstall it once you're done. And, of course, along with building the window frame, you'll need to know how to install the window properly, and finish off the job inside and out once it's in place (more on that later).

Perhaps the biggest caveat of all: beware the brick house. The framing on the inside is essentially the same regardless of the exterior cladding. But if you're removing bricks, you'll need to support the load above them, usually by installing a steel lintel across the top of the new opening. This can be finicky – and structurally significant – work that's probably best left to a mason.

With only basic tools it's possible to add a window to your home with relative ease. At its easiest, this is a job any DIY'er can handle. On the other hand, if things aren't stacked in your favour, though you don't yet know it, here are some tips on how to decide if this project is something you should take on.



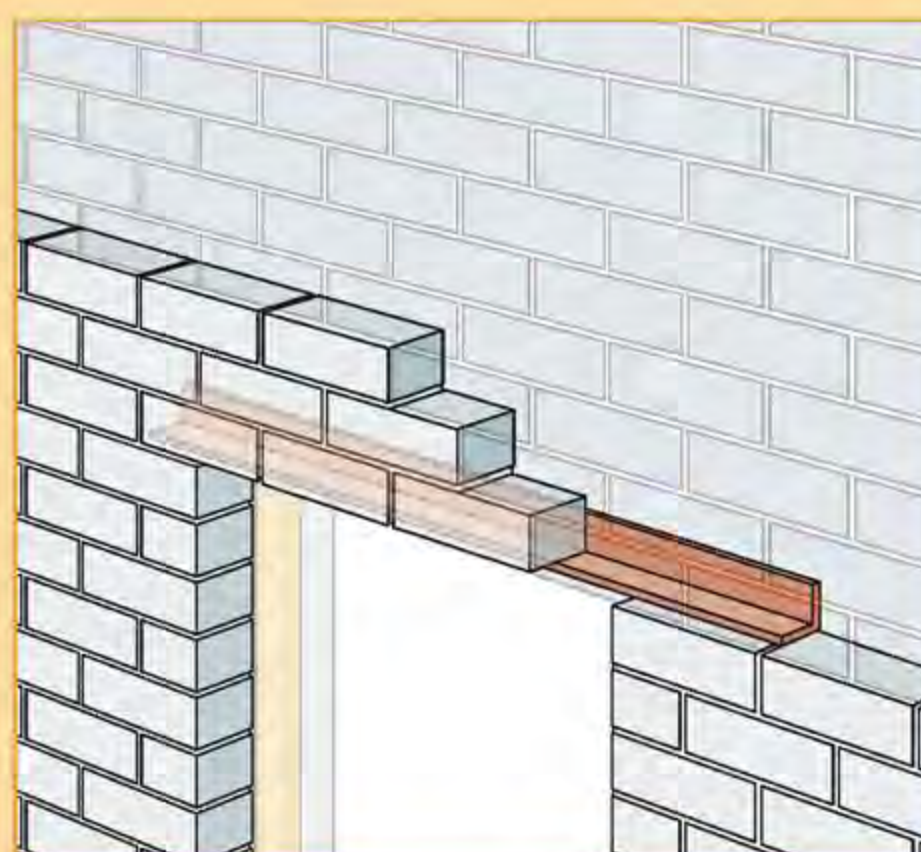
Demo Derby

If this is a retrofit project, before you pick up the tools you need to do a bit of planning to figure out where your new window will go. While the ideal spot to catch morning light or the sun as it sets might be on one particular wall, the project gets exponentially more complicated if there's plumbing, wiring, or duct work running where you'd like your future window to be.

If your basement (or crawlspace) is unfinished, you might be able to see where all the mechanicals run to help narrow down the location list. If you don't have a sophisticated sensor that can detect plumbing and wiring behind walls, you'll have to open up the drywall (or other wall finish) to make sure you have a clear path to the great outdoors before you begin. Ultimately, you'll need to remove enough of the existing interior wall to give you room to install all the new framing members. It may not be the end of the world if you have to hire a plumber or electrician to re-route one line, but re-running ductwork can be a messy, complicated project.

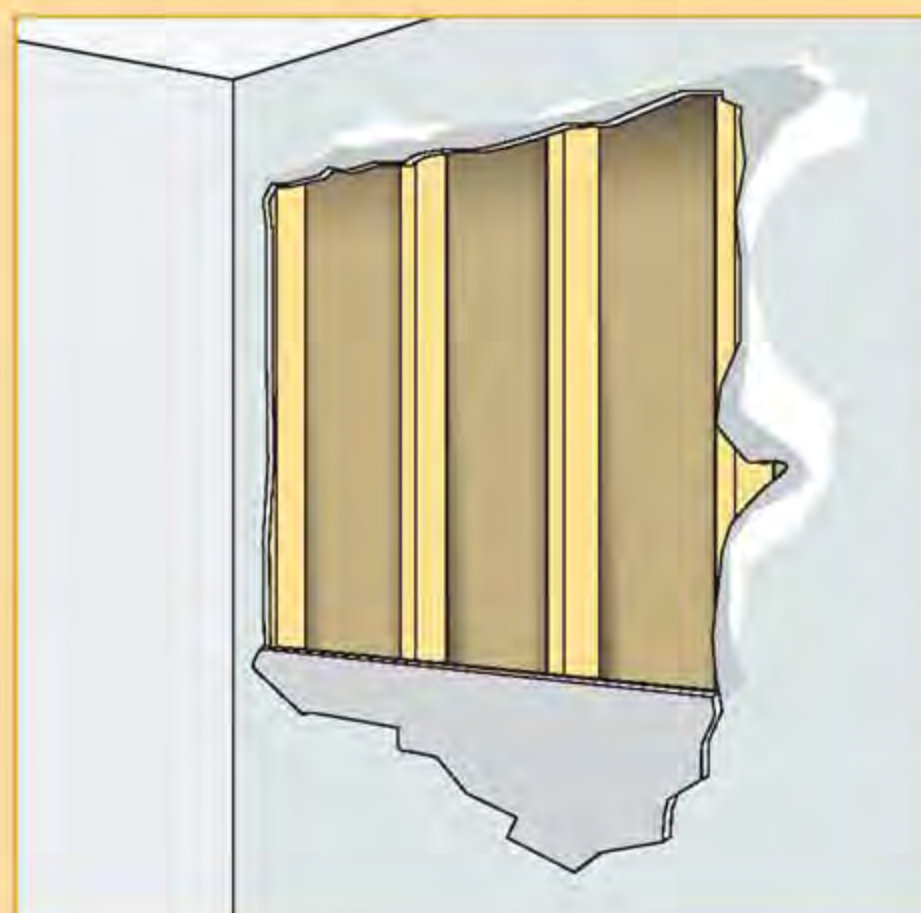
From the Ground Up

In most Canadian jurisdictions, you don't need a building permit to construct a building such as a shed or a cottage bunkie if it has a footprint of 108-sq.ft (10 sq. metres) or less. Building new means you also avoid a lot of the retrofitting hurdles such as re-routing existing wiring, ensuring the insulation and vapour barrier remain continuous, and matching the interior and exterior finishes to



Brick is Tricky –

When the exterior of your home is brick you might be best to call a professional mason. Brick needs to be supported directly above where any cuts are made so they don't crumble, crack or fall off your home.



Inside View –

Once you have selected your window location you need to make sure no plumbing or wiring will impede your progress. If you don't have expensive sensors, simply removing the drywall is the best approach. It's possible to re-route plumbing or wiring, but it is a bigger job.

products that may no longer be available.

New construction also gives you the advantage of being able to place your window in the ideal location to capture the light. To do so, you'll want to stand on the site at different times of day to see how the sunlight will hit the structure to determine the best positions for window placement to catch the rising and setting sun, or avoid the direct daylight if keeping the space cool is a priority.

If the window you're installing is a casement window (one with hinges on the side, see "A Word About Windows"), you'll also want to consider the direction of the prevailing wind, and have the hinged side of the window positioned so that it catches the breeze when opened.

Get to Work

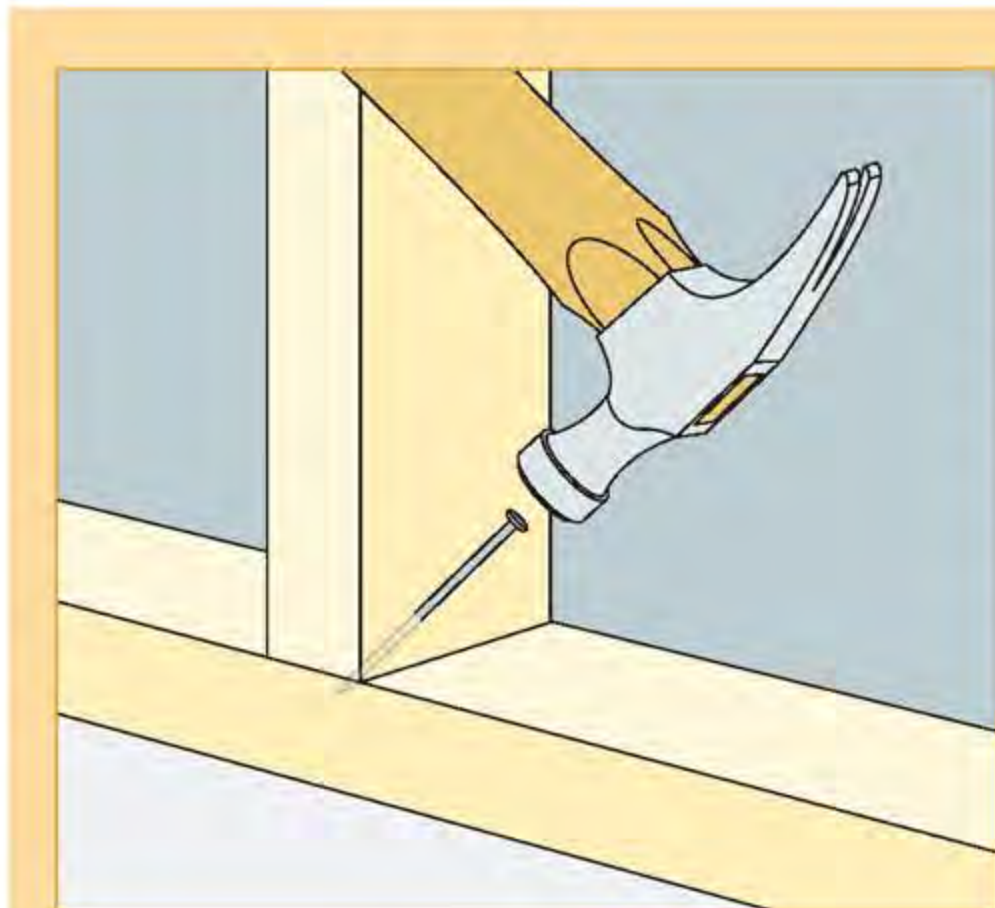
Now that you're ready to pick up the tools, this next part is relatively

straightforward. The tools in question are fairly basic: a tape measure, level, something to cut lumber, and something else to drive the nails. For the latter two, you can use either power tools or, if you're feeling particularly old-school, hand tools.

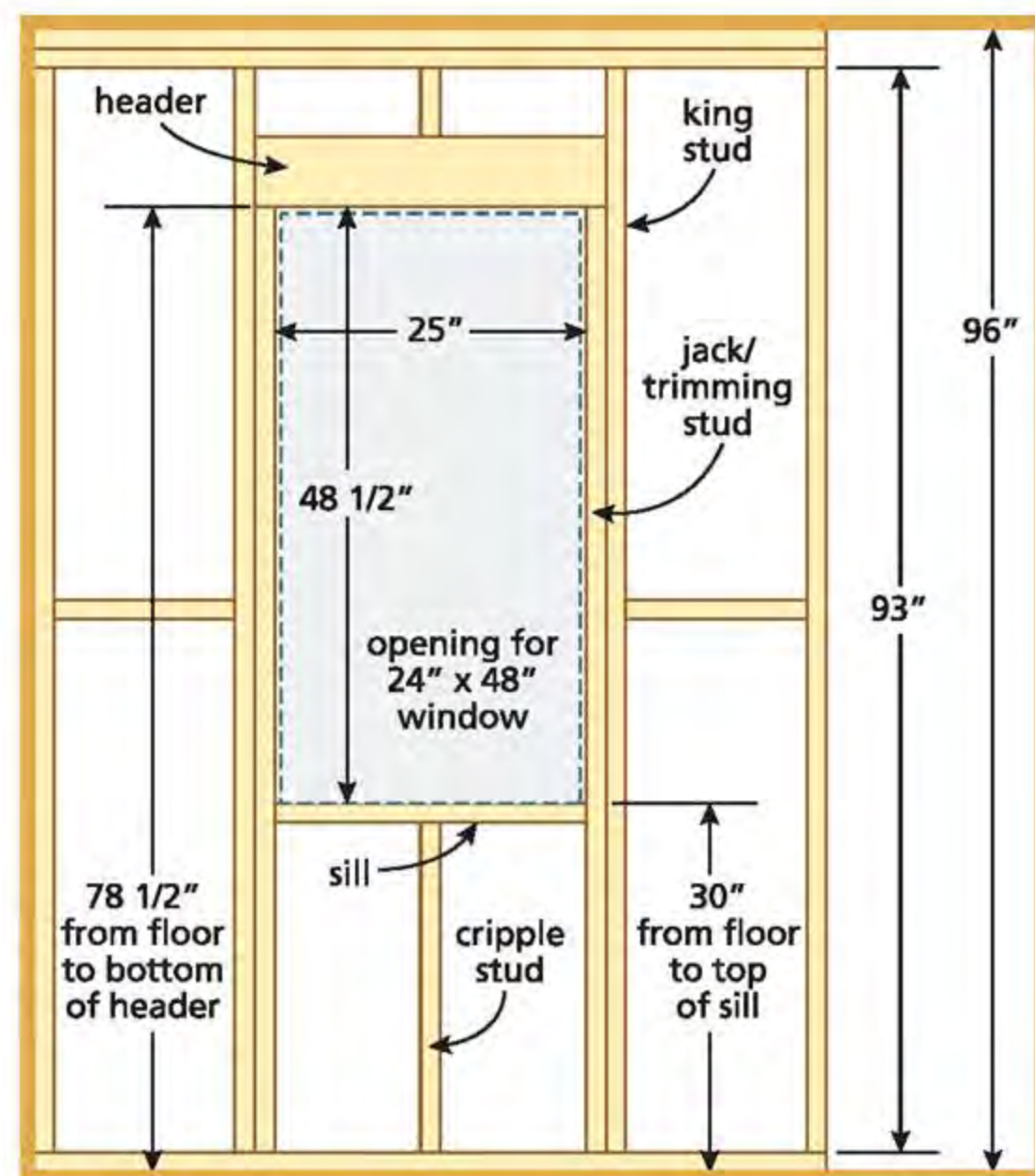
First, let's go over a bit more terminology. You don't necessarily need to memorize these terms, but they'll help you keep the components and steps in order.

Starting at ground level, you've got your bottom (or sole) plate, a single two- or three-by piece of lumber laid horizontally, flush with the outer edge of the floor. King studs are toe-nailed (driven in at a roughly 50°) into the top of the bottom plate, and run vertically, supporting the top plate, a doubled-up horizontal lumber sandwich that spans the width of the wall.

You'll be installing jack studs (also known as trimmer studs) on



Toe-Nailing – To secure the king studs, a technique called toe-nailing needs to be used to drive nails, at an angle, into the upper surface of the bottom plate. The king studs will travel upwards to the top plate, and provide much of the support needed to create a strong wall.



the inside of the king studs. On top of the jack studs rests the header, typically a doubled-up 2x6 that sits with the wide side upright.

Depending on the width of the window, you'll also need one or more cripple studs, short length of lumber that support the sill and connect the header to the top plate.

In retrofit situations, ideally, you'll be able to incorporate one or both of the original king studs. If the positioning doesn't work, you'll have to use additional cripple studs to support the sill.

As an example, we'll use a 24" wide by 48" high window, set into an 8' high wall, with a windowsill that's 30" above the

floor to calculate your cutting list and to show where everything should go. Adjust the measurements accordingly to suit the window you're installing.

While the window will sit on the sill, you'll want about a 1/2" gap on either side of the window and between the top of the window and the header to give you clearance to get it into the opening, then level it with shims as needed. You'll fill the

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A Word About Windows

Windows come in all shapes, sizes, and styles. Here's a quick run-down of the basic types so you can talk the talk.

- Awning: Windows that are hinged at the top.
- Bay/Bow: Multi-paneled windows that sit on a frame that projects out from the building.
- Casement: Windows that are hinged on the left or right side.
- Fixed/picture: Non-opening windows.
- Hopper: Windows that are hinged at the bottom.
- Horizontal slider: The name says it all.
- Single-hung/double-hung: Windows that slide vertically. Single-hung means one is operational and one is fixed.
- Tilt-and-turn (or "Euro-style"): Windows with two sets of hinges; one on the side like a casement, and another set on the bottom, allowing the top to swing in.

gap with spray foam insulation after the window is secured to the frame.

The order of installation is as follows:

- Nail your jack studs to the king studs.
- Install the header on top of the jack studs.
- Level and install the sill.
- Install top and bottom cripple studs.

Check that your opening is square by measuring diagonally across it from both sides. The two measurements should be within 1/8". If it's off, adjust, or use shims to level the window before screwing it to the frame.

If the window is new, follow the instructions that came with it. If your window is second-hand, set it in the opening and get it leveled horizontally. Use 3" screws and drive them through the window frame into the jack and king studs. Use two or three screws to affix both sides of the framing.

Finishing Touches

Once the window is installed, you'll need to apply casing trim that matches the other windows in the house and possibly do some touch-up painting. On the exterior, use foam insulation or caulking to seal the gaps between the window and frame. You'll also need to match the existing siding or other cladding. That's the easy part. The hard part? Trying to casually work the word "fenestration" into a conversation.

ALLAN BRITNELL
abritnell@sympatico.ca



Many (many) years ago Allan Britnell had summer jobs installing windows and doors. He's now the managing editor of *Renovation Contractor* magazine and a freelance contributor to numerous other publications.

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SMART LOCKS

Make for Better Home Security

Thanks to advances in smart technology protecting your family, home, and its contents, is easier than ever.

BY CARL DUGUAY

We're living in a highly connected, wireless world. Just about everyone – young, old, and in-between – uses a mobile communication device – either a Smartphone or tablet computer. In fact, according to industry statistics, Canadians are among the most intensive users of mobile devices: 55-percent use a Smartphone and 25-percent use a tablet computer. Various estimates place the annual growth rate for these devices at around 30-percent over the next couple of years.

Being able to control a wide variety of basic home functions

and features through a mobile device offers a considerable degree of convenience in managing your home. It also enables you to take a more active role in safeguarding your family and your possessions.

Any product that has a wireless communication feature integrated into its design can be controlled by a mobile device via Bluetooth or Wi-Fi. Even older non-wireless products can be controlled when equipped with the right interface.

You can easily envision your mobile device becoming the nexus for controlling virtually all home appliances - from thermostats, air conditioners, heating systems, security cameras, lighting and door locks, to entertainment systems, clothes

washers, vacuum cleaners, outdoor water sprinklers and even coffee makers. Over the coming years it's likely that a majority of the home appliances entering the market are going to have wireless connectivity built into them.

One area that has taken advantage of smart technology is home security. There are a variety of smart wireless security options that can help make your home more secure. The most popular of these are smart locks. They're reasonably easy to install and fairly simple to use. If you have basic DIY skills you should have no problem hooking up any of these home security devices. Other smart devices that enhance home security include smart doorbells, smart garage openers, smart security cameras, and smart lighting, which we'll cover down the road.

Features to consider

The new generation of smart locks enable you to use your mobile device to remotely lock and un-lock doors for anyone who needs to get into your house, garage, or shop. You can also share smart keys (eKeys) with family and friends to control and monitor entry to your home. These smart locks can also be connected to other smart devices in the home, including lights, doorbells, thermostats, and sound system, through a smart home hub (see sidebar: The Smart Home Hub). Not

all smart locks are compatible with both Android and iOS devices, so check to ensure the lock you choose is compatible with the device you use. Bear in mind that adding a smart lock won't necessarily provide any additional security for your home unless it's combined with some kind of alarm or camera system. However, it will add a measure of convenience.

Installing smart locks

In general, smart locks either replace the existing door lock, or they replace the thumb latch on the inside of the door – which makes them a good choice for renters as they can take the lock with them when they move. Installation of either of these styles is fairly easy and doesn't require you to drill any holes in the door. Virtually all smart locks require batteries that typically last between six months and one year. Either a flashing light on the lock, or the mobile device itself, lets you know when the batteries need replacing. You do need to check that your current deadbolt is working properly, otherwise, if the smart lock you choose replaces the existing deadbolt, it may not function properly. For instance, if your door needs to be pulled closed with one hand, while turning the deadbolt with the other hand, you'll have to fix that slight problem before a smart lock will work.



Yale Real Living Assure Lock

\$199.00

Yale2You.com

A more formal looking lock style. It replaces the existing lock hardware – there is a keyless outside housing with a touch screen keypad, a deadbolt, and an interior housing with a twistable switch. You can open the door with your mobile device via Bluetooth or with the unit's keypad. It's Android and iOS compatible. Remote control is via a mobile app (WiFi connection). Includes a two-way speaker, eKeys, and activity logging. Doesn't automatically lock the door. Comes in 3 different finishes. Compatible with the Nest smart thermostat and Smart Home Hubs that use Zigbee and Z-Wave technologies. This style of smart lock is one of the most popular, and there are quite a few brands to choose from. Similar products: Schlage.com, KwikSet.com, SamsungDigitalLife.com, BaldwinHardware.com

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Opening and closing

Smart locks are controlled by your mobile device via Bluetooth or a WiFi connection. Some locks provide both options. WiFi connected locks offer the advantage of being remotely controlled, so you can check to see if you've locked the door when out of town, or open the door to let Uncle Bob in to water the plants.

Different brands may have one or more ways of unlocking the door, including: physically touching the lock, waving your smart device in front of the lock, by spoken commands, or via an app. Some automatically open the lock when you enter a defined zone close to the door. Some, but not all, automatically lock the door after you enter or exit your home.

But what happens when you don't have your mobile device at hand (or if runs out of battery power)? Some locks include a touch screen keypad, others a remote key fob, while some retain a physical key.

eKeys

Also referred to as digital keys and virtual keys, they enable you to share access to your home with others via their mobile devices. Most enable you to specify when the smart key will expire. Some locks enable you to create multiple eKeys, others charge a nominal price for additional eKeys.

Tracking

Also called activity logging, this feature provides a time list of everyone who enters and exits your home. This is convenient if you've given out eKeys to family or friends, and for keeping track of when the kids really do get home at night.

Four popular models

There are quite a few brands on the market, and many brands have multiple models. Here are four popular models widely available across Canada to get you started.



Kevo Plus Gateway

Kevo

\$199.99

WeiserLock.com

Looks most like a conventional lock. Replaces the exterior existing lock and deadbolt on a door. Opens the door automatically via Bluetooth, with a remote key fob, or with a standard key. Doesn't automatically lock the door. Android and iOS compatible. Works with the Nest smart thermostat. With the optional Kevo Plus Gateway you can remotely open and lock the Kevo. Only includes one digital share key – additional eKeys cost \$2 each. Similar product: Lockitron.com

The Smart Home Hub

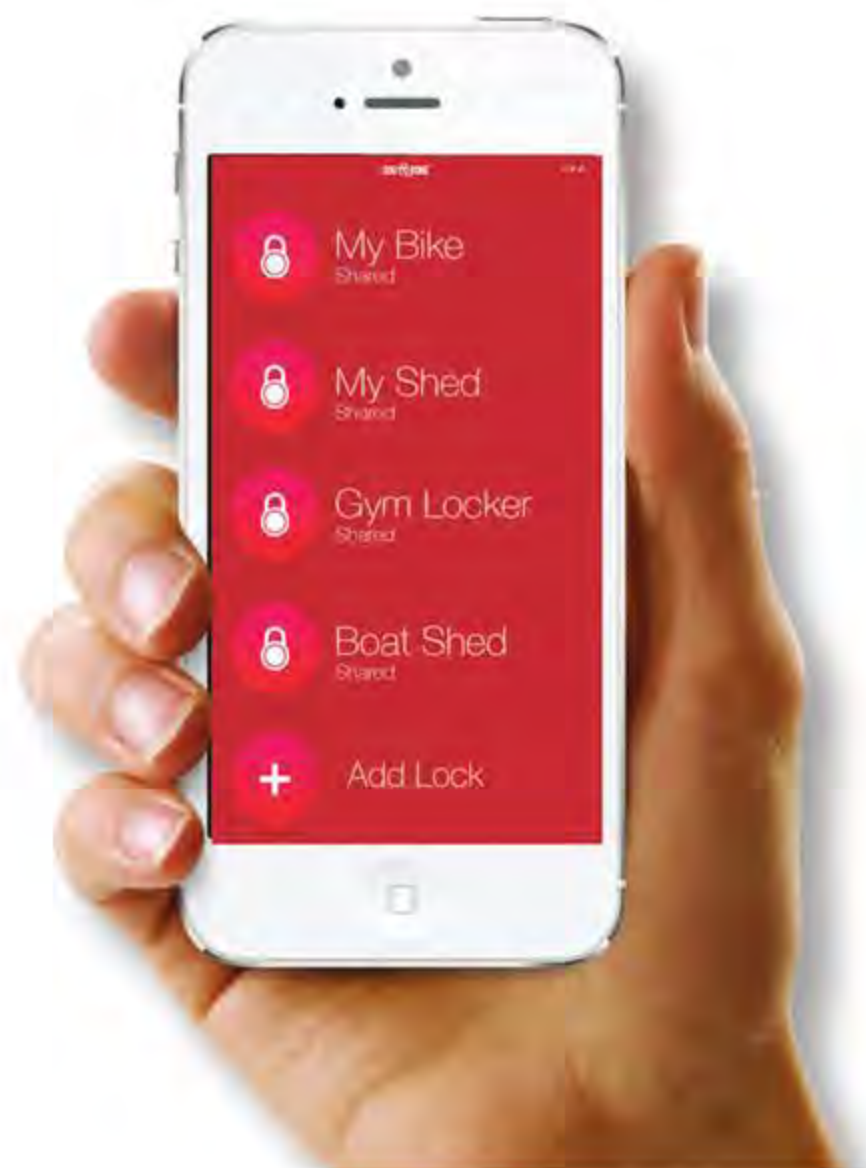
These are hardware devices that connect and control communication between the various 'smart' components that make up a home automation network – such as locks, thermostats, security cameras, energy monitors, lighting, sound systems, and the like. Essentially, they enable you to get all your smart-home devices working together. You control the smart home hub through an app installed on your mobile device. Examples include Logitech's Harmony Hub, Samsung's SmartThings Hub, and Phillips Hue Bridge. Some of these hubs can connect to devices that use Zigbee and Z-Wave wireless technologies, popular with smart lights and security systems.

August Smart Lock

\$229.99

August.com

Unlike the Kevo, it attaches to the inside of a door – replaces the inside thumb turn on the lock and uses the existing deadbolt and exterior key cylinder housing. As with the Kevo, you can use a key as an emergency backup. Features include eKeys, auto unlock, time delay auto locking, and activity logging. Remote control requires the optional Connect AC-R1 adapter (\$89.99). Android and iOS compatible (for Apple mobile devices there is an August Smart Lock HomeKit Edition). Works with the Nest smart thermostat. Similar product: DanaLock.com



LockSmart

\$89.99

DogAndBoneCases.com

This is a detachable, portable, weatherproof padlock style smart lock for securing a workshop, shed, bike, locker, or gate. Features eKeys and activity logging. Powered by a USB rechargeable long run-time battery. Android and iOS compatible. Similar products: Noke.com, MasterLock.com



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Healthy Clear Coatings

What They Are, How They Work and Why You Should Use Them

We woodworkers cover a lot of project styles and applications; but which finish is best for what project? Which will give us the enhancing result we imagine, protect our project and offer easy maintenance? I'll discuss here which types of finishes work best in what applications, plus expose some facts about today's "healthy" finishes; healthy for you, your loved ones and our planet. To see photos of sample boards, and read some application tips, visit our website to read this article online.

Photos by Mark Salusbury (Product Images by Manufacturers)

BY MARK SALUSBURY

Long ago and far away, woodworkers used natural solutions to treat and coat their products. Bees and carnauba wax; oils extracted from walnut, tung, flax and other plants; extracts of the lac bug, which when mixed with alcohol created lustrous shellac. Healthy finishes indeed but short on durability and requiring regular replenishment or skill to apply and maintain.

Industrial Age manufacturers developed new solutions which, mixed with petrochemical solvents, could be applied fast, cured to a hard film and required little maintenance. We makers of all stripes simply accepted the smelly solvent fume induced wooziness and the toxic cleanup of these oil-based finishes. The options were spirits-based coatings or more highly refined thinners-based coatings and lacquers. These manmade coatings, diluted and carried using petrochemical liquids, give off massive volumes of volatile organic compounds, "VOC's", which have since been proven to be very serious health hazards to all life forms.

Briefly, not all VOC's are bad. Biological VOC's, widely found in nature as "green leaf volatiles" within the scents emitted from plants, is their means of communicating with other natural creations. Animals, molds, fungi and other organisms also produce mostly harmless VOC's. The finishes of long ago and far away fall within this group.

Manmade, or "Anthropogenic", VOC's are a whole different story. These, the most harmful, are notably found concentrated indoors; while not immediately toxic, in low concentrations the long term effects develop slowly and compound as they evolve. A principal source of these nasty VOC's has been paints and other coatings whose carrier solvents were principally aliphatic hydrocarbons, ethyl acetate, glycol ethers and acetone. These coatings and carriers can outgas for months or even years depending on the product and the ventilation where it's applied.

The Age of Awareness

Today, in what I'll call The Age of Awareness, solutions are being found to suspend the hard-curing resins like those in the varnishes, urethanes and lacquers we'd grown dependent on, in a carrier with none of the life threatening side effects; low and "zero" VOC products which meet or surpass our expectations. Enter aqueous solvents, aka water; more highly refined petrochemical base compounds which outgas totally within days or even hours, and high solids resins needing less solvent carriers by volume, dramatically reducing our exposure to harmful VOC's.

Since 1990, agencies like the U.S. Environment Protection Agency, the Ozone Transport Commission, the California Air Resources Board and others, then in 2003, Environment Canada, established regulations to restrict the volume of VOC's in coatings across North America, the limits varying by a) type of substance, and b) its intended application. Consequently, coatings manufacturers have developed new compounds which generally far exceed these regulated

limits. By definition, for a coating to be low VOC compliant they have to limit VOC content to less than 50 grams per litre, 60 to 70 percent less than in traditional oil-based coatings. Pleasingly, this new generation of coatings also exhibit greater durability, stain and abrasion resistance which means less frequent recoats; minimal odour; antimicrobial properties which resist mold and mildew in cured finishes; and surfaces which are easily washable and scrubbable using gentle cleaning products, no harsh chemicals.

We've gone full circle, rediscovering traditional coatings, successfully altered others and developed new friendly compounds that really rock.

How low is low enough?

So how do we qualify and quantify VOC's? The benchmarks set by law limit oil-based varnishes to less than 450 grams of VOC's per litre and thinners-based lacquers less than 550 grams per litre. By comparison, what I call "friendly finishes" are defined as follows:

No VOC's... finishes made from natural oils, waxes, water, natural minerals, milk casein, and/or dyes from nature or earth minerals.

Zero VOC... finishes or coatings with no more than 5 grams of VOC's per litre by volume.

Low VOC... paints and stains with no more than 200 grams/ litre by volume and varnishes within 300 grams/ litre by volume.

In reality, most manufacturers' products are vastly below these legal limits, within the 50-150 grams/ litre range with some as low as 25 grams/litre and less.

Buyer Beware – some manufacturers legally skirt the VOC compliance issue; if a coating product contains VOC's higher than the legal limit, they may still market it provided it's sold in containers smaller than 1 litre. If you're health conscious and wonder what a product contains, read the label or the health and safety literature.

The most widely used solvent/thinner in use for surface coatings is water. Second to that is low aromatic white spirit, or isoaliphate, a petrochemical refinement in which the most dangerous aromatic hydrocarbons have been removed. Synthetic isoaliphate solvents have been created using extracts from citrus fruit peel and contain limonene. None of these solvents are particularly safe by themselves or in extreme volume but used in coatings as recommended, pose little risk.

Prepping the samples

With a couple of noted exceptions, all the 7/16" x 4 5/8" x 11 5/8" sample boards I used were ash sanded to 180-grit. Only the waterborne varnishes needed a quick scuff sanding with 400-grit paper between coats.

I applied each product with a fresh 1-1/2" square pad of white Scotchbrite (or equivalent) ultra-fine abrasive. Each sample received three coats of product, except two as noted, leaving the surface as recommended by the manufacturer for each application. My shop temperature at the time of this evaluation averaged 25° C with between 51 and 58% humidity depending on the day.

Four main categories

I'll break the products I've examined here into four groups, defined by how they interact with wood; drying oils, soft film finishes, waterborne film finishes (varnishes) and microporous surface coatings.

Drying oils

These protect the wood from inside by penetrating deeply, enriching the wood's grain, figure and natural tone but will darken over time. They build little film, adding only subtle durability. Oils cure through exposure to the air (oxidization), building sheen according to the number of coats applied. Any resulting film is a soft, breathable membrane, easily refreshed by adding more oil or top-coating with wax or a sympathetic film finish once fully cured. The oils I tested here amazed me by penetrating completely through their 7/16" thick sample boards; no other finishes absorbed this completely. Well suited to food prep woodenware (cutting boards, salad bowls, etc.) which you'll want to recoat regularly for appearance. They're also fine for children's toys and furniture, secondary components for furniture or cabinetry (legs, stretchers/stringers, cases) or conversely, where you expect the surface will see abuse and you want easy regular refreshment with the same or a compatible product.



Homestead House pure Hemp Oil

No VOC's - 250ml \$13.00 / 500ml \$23.00 / 1 gallon \$69.99

With a thin consistency and a greenish colour, this has a faint new-mown grass scent. I maintained a damp film, letting it sit for 30 minutes before wiping dry. Each coat seemed to only absorb moderately. Any bloom could be wiped away easily. Each coat could be applied 24 hrs. apart. The resultant surface shows a yellowish soft golden colour, transparency and sheen free.

Lee Valley pure Tung Oil

No VOC's - 250ml \$13.90

This is a thick liquid with a golden colour and sweet, nutty aroma. The first coat seemed to absorb very little but I let it setup and removed all trace product after 10 minutes. After 24 hrs. I repeated the process for each of the next two coats. I was rewarded with a rich, softly pleasing film finish, likely the result of a higher solids content than others in this group.



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Fuji 2-Stage System

To meet the growing demand of the DIY market, Fuji Spray introduced the most powerful 2-stage spray system on the market. The Semi-PRO 2 is an industrial grade unit, designed for the DIY/ serious hobbyist and offers features like no other in its price range. This system is equipped with the Fuji M-Model non-bleed spray gun with fan control knob to adjust pattern size. A powerful 1400 watt 2-stage bypass motor in the metal turbine case ensures a great finish will be achieved with almost any type of coating. This system also includes a full 25ft hose, quick connect coupler, air control valve and user manual.

www.fujispray.com/hvlp-systems/



Soft Film Finishes

Natural “drying oils” based, these products have been processed using heat, called polymerization, altering their chemical structure. Different from their oxidizing cousins, each polymerized coat bonds and layers to its previous coat, creating a durable, breathable membrane. These can be easily maintained by applying more thin coats as preferred. The result is an enhancing transparent coating with little applied tone, though this will deepen over time, dependent on the number of coats applied.

Tried & True Danish Oil

Zero VOC's - 473ml \$17.95 / 946ml \$26.50

Polymerized linseed oil-based, this food-safe product has a thin liquid consistency, a golden colour and a sweet nutty aroma. It absorbed really well. For each coat I maintained a wet surface for 5 minutes then wiped thoroughly, buffed dry and let each coat set for 24 hrs. It cured to a soft golden sheen with clarity. No doubt more coats would build the sheen. It would be excellent for kitchenware, furniture, children's toys and any interior natural wood surface, except maybe flooring.



Tried & True Varnish Oil

Zero VOC's - 473ml \$26.50 / 946ml \$38.50

Polymerized linseed oil blended with modified pine resin, this is a heavy liquid with a high solids content, a deep golden colour and a sweet nutty aroma. The first coat absorbed moderately; after 60 minutes I wiped away the surplus and buffed the surface dry. I repeated this after 24 hours for each coat. Its water-resistant film finish has a rich tone and a rich semi-gloss sheen. Also food-safe, it's well suited for interior trim/millwork, furniture and cabinetry.



Tried & True Original Finish

Zero VOC's - 473ml \$26.50 / 946ml \$38.50

Polymerized linseed oil blended with beeswax. Food-safe, a gel/paste with a golden colour and sweet/nutty aroma. Absorption of this very viscous finish seemed minimal but developed nicely as I let it sit for 60 minutes then wiped and buffed the surface dry. Likely, letting it cure longer between coats would advance the total cure. It produced a rich tone with a soft sheen. I expect this would be excellent for turned woodenware finished on the lathe.



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Waterborne Film Finishes (Varnishes)

These hard, thick coatings are typically applied to natural wood tabletops, trim and furniture; they cover well but penetrate little. Acrylics, alkyds, acrylic fortified polyurethanes and polyurethanes are all polymer resin-based, curing through chemical action to form durable coatings which bond to the woods fibres, fill its pores and harden.



Broda Clarity

VOC under 90 g/L - .95 litre \$18.00 / 3.78 litres \$64.00 / 18.9 litres \$294.00

A clear, pure, waterborne, cross-linking acrylic for both interior and exterior use, UV stable and mildew resistant. It can be applied by brush, roller or spray. A very thin milky coloured liquid with a faint sweet/acrid "ammonia" scent, the first coat absorbed well leaving good film. I was able to scuff sand after 30 minutes but waited 4 hours to recoat. Three such applications yielded an exceptionally natural hard film with depth, clarity and a pleasingly soft sheen. This can also be applied over stone, concrete and masonry.

Emtech EM2000 Varnish

VOC 23 g/L - .95 litre \$26.00 / 3.78 litres \$82.00

Available in gloss, semi-gloss and satin all at the same pricing

This is an interior/exterior alkyd varnish of waterborne hybrid alkyd resins. My sample is "satin", requiring steady stirring to suspend the silica (ultra-fine sand) matting agents. A creamy liquid with a milky colour and muted crisp acrid aroma; I've no doubt, like other such emulsions, the gloss and semi-gloss versions are clearer and thinner due to less matting agents. User friendly, it can be applied by spray, synthetic brush, pad and closed-cell foam roller. Designed for fine furniture and cabinetry, woodturners enjoy this as an on-lathe padding finish; it's also fine for moisture and UV exposed woods such as window and door trim. With 34% solids by weight, it builds well; the first coat over bare wood absorbs nicely, drying to the touch within 20 minutes. Scuff sanding and recoat time is after one hour; I applied three coats in an afternoon. It flows and levels well, produces a light golden film with a soft sheen, brilliance and clarity.



Varathane Triple Thick Clear Finish

VOC less than 250 g/L - 946 ml \$31.99

Available in satin, semi-gloss and gloss (as tested)

946 ml \$31.99 available in satin, semi-gloss and gloss (as tested)

This polyurethane/acrylic differs from all other products tested; it is noticeably ("3X") thicker in consistency with a claimed 39% solids. It's milky white, syrupy so can only be applied by quality fine bristle synthetic brush, and is claimed to allow projects to be finished in one coat, though recoat time is stated to be after two hours. Designed for interior furniture, casegoods and trim only; there are no exterior or flooring versions available. At shop temperature, it had a very short working time, the first coat covering well but left bristle streaks despite my heavy coat/one smooth brushstroke method. After two hours and sanding to blend-out the bristle ridges, a second coat levelled better but still not perfectly, yielding a noticeably thicker, grain obscuring film coating than others, with the same warmth, sheen and natural tone as its "Diamond" cousin. In a slightly warmer, more humid shop, I expect "Triple Thick" would have levelled quite nicely as claimed.



Varathane Professional Clear Finish

VOC less than 145 g/L (gloss), less than 125 g/L (satin and semi-gloss) - 236ml \$13.99 / 946ml \$23.99 / 3.78L \$59.99 Available in satin, semi-gloss and gloss (as tested)

Different from the other two Varathane products tested, this is an oil-modified urethane acrylic likely accounting for its slightly amber warming appearance. Out of the can it's like the others, white with a very faint acrid scent. It has a milk consistency, +/- 27% solids by volume and can be brushed, padded or sprayed without thinning. It can be applied over bare wood, oil-based, gel or water-based stains so well suited for all interior trim, furniture and cabinetry. Having pre-raised and lightly sanded (220-grit) the grain, the first coat absorbed well and dried within an hour in my shop (20°C/48% humidity). Fast drying also means short working time so brush strokes should be kept to a minimum. Three coats applied within six hours, lightly sanded between coats, produced a really satisfying sheen and a very satisfying amber cast, nicely enhancing the wood without looking cosmetic. An excellent result, easily applied.

Vermont Natural Coatings- PolyWhey- Furniture Finish

VOC 180 g/L - Quart \$37.99 / gallon \$121.99 Available in gloss, semi-gloss and satin

Uniquely, PolyWhey uses whey protein, a by-product of cheese making, to produce a polyurethane polymer. Waterborne, it is designed for interior applications including furniture, cabinetry, toys, trim and woodenware. It can be applied to bare wood and over cured oil and water-based stains and finishes. My gloss sample was a milky colour liquid with a whole milk consistency and an acrid aroma. It can be applied by synthetic brush, pad or spray. I pad-applied a thin wet coat and let it dry two hours, followed by a second coat. I scuff sanded before my third coat, which cured to a crystal clear gloss, enhancing the wood's tone, character and texture.





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Microporous Surface Coatings

These “new” coatings engage with the wood on a molecular level. Designed for interior applications, they reinforce the wood’s surface structure, reject liquids yet allow moisture vapour to be absorbed and released without compromising the wood’s structure or appearance. Maintenance, largely unnecessary, is easy if required. Unlike traditional finishes, requiring large amounts be applied for proper coverage and density, these “microporous” coatings must be used very sparingly to gain the best result, soooo... A) despite their price these are exceptionally cost effective and B) the volume of applied VOC’s and chemicals is so low that out-gassing occurs within hours, not weeks or months like others, hence safer wood products and environments far quicker.



Osmo PolyX-Oil Pure 5125

VOC less than 50 g/L - .125 litre \$26.00 / 1 litre \$160.00

A clear finish based on natural vegetable oils (sunflower, soya, thistle) and waxes (carnauba, candelilla), paraffin, drying agents and water repellants, this is an oily liquid with a pinkish colour and a faint acrid odour. Working only a few drops well into the wood surface using a swirling pattern with my synthetic pad, I created a uniform film on the surface, left it for 35 minutes then wiped it off thoroughly. I repeated the process after eight hours then again for a third coat. The result was a rich wetted look with clarity and little sheen, accentuating the grain and drawing out the wood’s natural reddish tones. Designed for interior wooden floors and furniture (even children’s toys), it’s resistant to most common liquids and stains.



Rubio Monocoat Oil Plus 2C

Zero VOC’s - 1.3 litre Pure 2C \$203.80 / 1.3 litre Colour \$260.30

Costly at first glance, Monocoat has a reputation for 11 times the coverage of other finishes; 1 litre equalling 3 gallons of conventional coatings, plus it’s completed in one-third the time so a big labour saver. Available in “Pure” plus over 40 standard colors which can be blended for custom shades – Rubio’s one application (Monocoat), two-part solution uses a linseed oil base plus an accelerator, boosting the cure rate; fully dry after 24 hours, 80% cured in 48 hours and washable after 5 days. Monocoat is water, solvent and VOC free. Part A, is an oily, lightly coloured liquid with a sweet/acrid scent; the accelerator, part B, is a thick, clear odourless liquid containing isocyanates so skin protection and adequate ventilation are important. Out of curiosity I allowed a dab of each part to dry on glass separately. “A” formed a wrinkly skin as you’d expect from an oil product while part “B” dried rock hard and crystal clear. Designed for interior floors and furniture it is durable, resistant to wear, water and heat, fine for kitchens and bathrooms. I sampled both “Natural” and “Pure” products...

Natural; part A has a slight green hue. I mixed 3 parts resin to 1 part accelerator, applied a tiny amount, spread it into a thin overall coat, waited 15 minutes and buffed the surface off. That’s it. It dried hard in 24 hours to a straw yellow tone, a satin finish with subdued clarity. A very muted result.

Monocoat Oil Plus 2C – Pure; as above except having an amber colour. 24 hours after application my sample board softly glowed with a golden hue, a semi-gloss finish with tremendous depth and clarity; very enhancing without altering the wood’s natural character.

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Osmo TopOil

I recently finished a run of cheese boards. I wanted a food-safe finish, that would accentuate the grain and colour of the wood, and also be easy to apply. The obvious choice for me was OSMO TopOil. Once the finish is dry, water beads up on the surface of the wood, and the boards are easy to clean after use. Even wine won’t stain the wood. Down the road – after many servings of cheese, crackers and wine – it’s easy to reapply a light coat of TopOil, let it dry and put the cheese board back to use. Visit www.osmo.ca for more information. – Rob Brown



I hope now you have a better view of the finishing options available to you, and are well equipped to understand what's in a can and what its contents will bring to your future projects. Today's coatings, and those that have stood the test of time to become the basis of today's finishing products, perform really well and are both user and environmentally friendly, far nicer than their hazardous petro-based predecessors. And now you know how to pick just the right one, every time.

Broda - CBR Products,
www.cbrproducts.com

Heritage House – Homestead House Paint Co.,
www.homesteadhouse.ca

Lee Valley - Lee Valley Tools Ltd.,
www.leevalley.com

Osmo - Osmo Canada, www.osmo.com

Rubio Monocoat - Exotic Woods Inc.,
www.exotic-woods.com

Target Coatings - Wood Essence Distributing,
www.woodessence.com

Tried & True Wood Finishes - Lee Valley Tools Ltd.,
www.leevalley.com

Vermont Natural Coatings - Randalls,
www.randalls.ca

When it comes to choosing a finish everyone's needs are different, but my particular needs are largely satisfied by three products. I enjoyed using Varathane Professional Clear Finish, as it sprays nicely and is a nice finish to the touch. Osmo Poly-X Oil Pure will be used again in my workshop. It wipes on very nicely, providing me with a simple, user friendly way to apply a finish to small and medium sized objects I create. And I've always been a fan of Emtech EM2000 Varnish, as it's easy to apply with virtually any method, adds a warming amber cast to woods like cherry, mahogany and sapele, and I have never had a bad result while using the product.

Further Reading: For application tips, to view photos of all the sample boards and to read more hands-on reviews of many other products that couldn't fit into the print edition of this article, visit our website to read the online version of this article.

MARK SALUSBURY
salusbury@nexicom.net



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BY ROB BROWN

When it comes to drying our laundry I almost always hang everything to dry. It's a little harder in the winter – not because wet laundry won't dry outside, but because handling wet clothes outdoors during the winter is too cold for me. I have a different problem drying laundry indoors though. I've been known to hang wet laundry anywhere that will hold it, and my wife doesn't appreciate my eclectic approach as much as I do. The solution was to build a nice looking laundry rack for indoors, that's easy to fold up and store when we didn't need it.

This rack looks small, but it has 81' of hanging length – more than my outdoor clothesline. I can easily dry a huge load of laundry, and have room to spare.

Engineering

A rack like this is large enough to get in the way when it isn't in use. Even if I want to put it away one day, knowing I'll use it the next day, I want the process to be simple. Within about two minutes this rack will fold up and store in a closet. All you have to do is loosen the four wing nuts on the front of the rack, spin off the four wing nuts on the back, remove the two back braces, replace the rear wing-nuts and fold the rack up. When folded up the rack measures about 90" high, 21" wide and 4" deep. When completely disassembled the rack will measure about 54" × 21" × 2-1/2".

Sizing a rack

The dimensions of this rack fit a specific area in our home nicely, but it may not fit your home quite as well. Adjust the depth, and most importantly, the length of the rack you make to fit an area in your home.

The height of my rack works well, as I can first load up the lower level, then move onto the upper level, with minimal bending. A third level is an option, though it will make the overall

High and Dry

A Simple, Folding Laundry Rack

There's no cheaper way to dry your family's laundry than to simply hang it up. If you live in an apartment or condo, or don't want to contend with changing weather and seasons, this indoor rack is your solution.



Make Your Mark – Adding some pencil lines on the end grain of the blank will help you realign the parts once they're cut from the blank.

height quite high when the unit is folded up for storage.

I spaced the rungs 1-13/16" apart from one another. I wouldn't want to go any closer, and it might be an option to go 2" wide, if you want the clothes to be a bit easier to hang.

Breakout the material

I started with the blanks for the rungs, and machined two boards to final length, 5" wide and 3/4" thick. Next I broke out the blank that would give me the six supports. This blank was cut to final length, 5" wide and 3/4" thick.

Machine some dados

Start with machining the long rungs, that make up the majority of the rack. The supports will finish at 5/8" wide,

Dado the Rungs – Brown machined a dado 12" away from both ends, as well as one centered on the blank. The 5/8" wide dados were cut into the underside of the rungs.

so a 5/8" wide dado must be cut in the underside of the rungs, where they will join the supports. Mark the location of the supports on the two rung blanks, and, with the help of your mitre gauge, machine a 1/8" deep dado at the three locations in both of the rung blanks. The exact depth of these dados isn't crucial. I chose to machine the outer dados 12" from the ends, while the middle dado was centered on the blank.

Mark one end of each rung blank with a couple of lines so you'll know how they go back together, as the rungs will eventually be ripped from the blanks. For grain, colour and precision reasons you'll want to be able to assemble the parts how they came out of the blank.

Now onto the supports. Change the dado to a 3/8" wide setup, mark the locations of the rungs on the supports blank and machine the series of 1/8" deep dados. Just make sure to lay out the dados evenly, as I had to breakout a second blank because I made a mistake on my first attempt. Again, mark the end grain of this blank so the parts can be reassembled properly.

Cut pieces to width

With a rip blade in your table saw, rip the rungs and supports to 1/16" over

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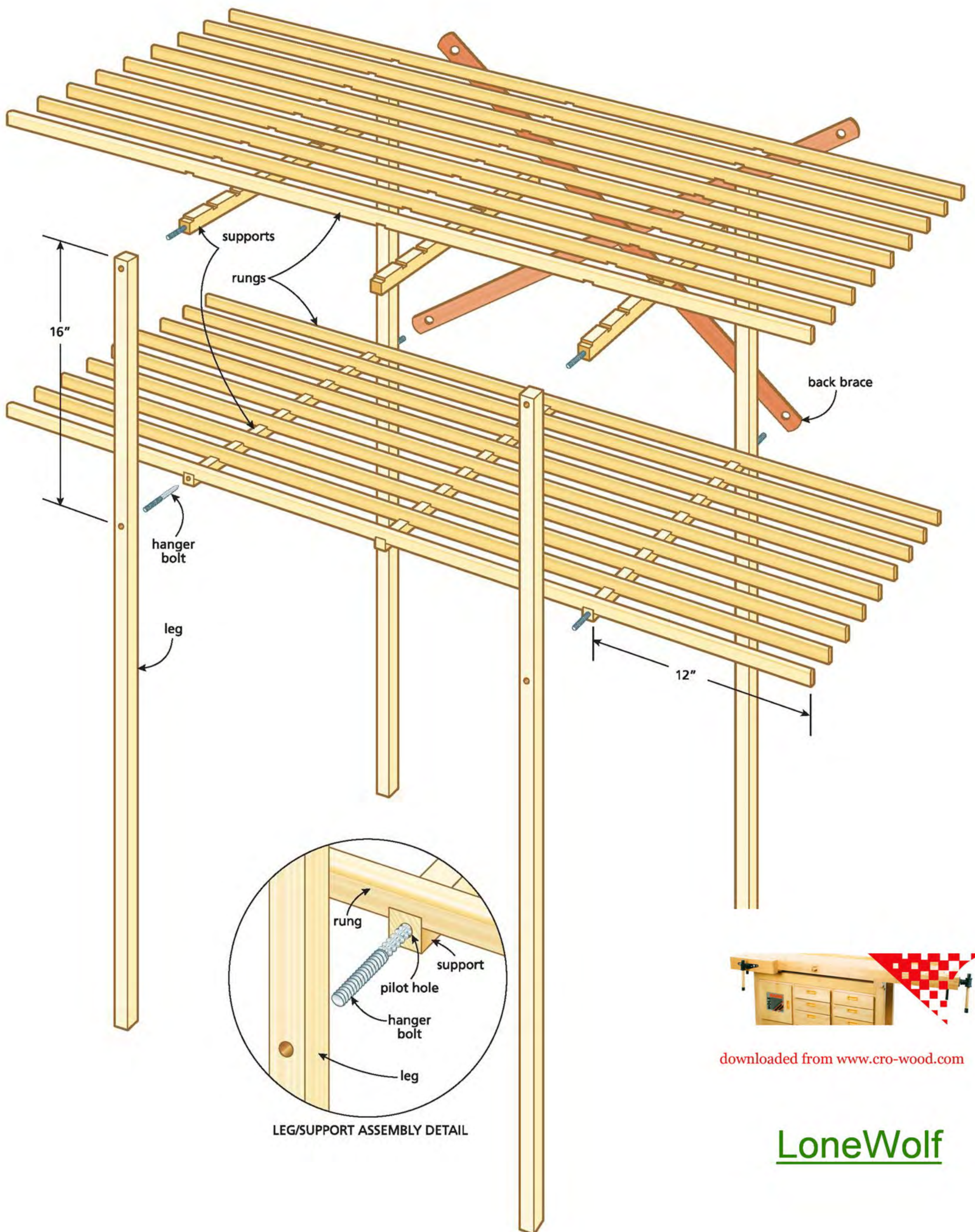
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Materials List

Part	Qty	T	W	L	Material
Rungs	18	3/8	3/4	54	White Ash
Supports	6	3/4	5/8	18-1/2	White Ash
Legs	4	3/4	3/4	48	White Ash
Back Braces	2	1/4	7/8	To Fit	Mahogany

Hardware List

Name	Qty	Size	Details	Supplier
Hanger Bolts	8	2-1/2" long	1/4-20	Misc
Wing Nuts	8	1/4"		Misc

featherboards allow the user to keep their hands away from the bit, and also produce a much more even cut.

Sand all the rungs and supports and ensure there are no sharp corners or edges that will catch clothes while the rack is being used. A little extra work now will go a long way to making your rack work well for years to come.

Assemble the rungs

Starting with three supports for one level, and three rungs, apply a bit of glue to the dados and bring the parts together. Use one small clamp at each joint to ensure the joints are seated nicely. Also make sure the assembly is square before leaving the first few parts to dry. After 30 minutes remove the clamps, apply glue to some joints and bring the parts together with clamps. Repeat this process until both levels are assembled.

Add the hanger bolts

I used 2-1/2" long 1/4-20 hanger bolts installed in the ends of the supports to attach the legs to both of the rung assemblies. Drill 3/16" pilot holes in the ends of each of the outer supports. I made sure the holes were in the middle of the supports so they were less likely to split. I also tested drilling a hole into a piece of scrap first, then installing a hanger bolt into the material I was using, so I wouldn't ruin the nearly completed assembly by cracking a support.



Dado the Supports – If you had many blanks to cut dados in it would make sense to set up stops to help speed the process, but with only one blank to machine Brown added pencil marks to the blank and cut these 3/8" wide dados.

their final width, then dress them to final width with your planer, ensuring each face is smooth. Sneak up on the final width of both parts, as each part should fit nicely in the mating dado. You'll want a fit that comes together easily, but with no movement between the rungs and supports once they're together.

Round-over top edges of rungs

Though a smaller radius will also work fine, I used a 3/16" radius bit in my router table to apply a bullnose to the upper face of all of the rungs. This will reduce creases being left on the clothes after they've been drying on the rack. A featherboard attached to the router table's surface presses each rung into the fence during machining, while another featherboard is attached to the fence, in order to apply downward pressure. The two



Bullnosed Edge – Two passes past a router bit and the top edge of the rungs will be rounded. Featherboards help with keeping the operation smooth and safe.



One Step at a Time – Rather than trying to glue the entire level of rungs up at one time, break the process into stages. First, grab the three supports and a few rungs, and glue them together. Clamps at each joint keep the assembly strong.



Properly Sized Pilot Holes – Once you've tested this with some scrap to ensure the pilot hole is sized properly for the material you're using, drill the hole into the end grain of the outer supports and install the hanger bolts.



Bring it Together – With the unit face down you can bring all the parts together in order to measure for the two back braces. Precision when measuring center-to-center distances is crucial here.

Use a pair of nuts, threaded against each other, to drive each hanger bolt into the hole. The front hanger bolts should protrude from the wood by about 1", while the rear hanger bolts should protrude an extra 1/4", as the back braces will fit over the rear bolts.

Legs

Break out the legs and cut them to final size. Drill a 9/32" clearance hole about 3/4" away from the top of each leg. Drill a second hole 16" away from the top end of each leg. Sand the faces of each leg, heavily ease each sharp edge and the legs are complete. These might be the simplest four furniture legs you've ever created.

Assemble and measure

Place the two front legs facedown on the floor. Insert the front hanger bolts on the middle rung assembly into the



Final Few Turns – Once the back braces are cut and drilled they can be secured with the wing nuts. The rack is now ready for action.

appropriate holes in the two legs. The middle rung assembly should stand perpendicular to the ground now. Add the upper rung assembly to the top holes in the legs. The final two legs fit into place over the hanger bolts, followed by four wing nuts on the visible hanger bolts. Ensure the assembly is square before tightening down the four wing nuts.

You can now measure the length of back braces that are needed. You can obtain exact measurements of the center-to-center distances of the two sets of opposing hanger bolts. Take these two measurements, add 2" to both figures and cut the back braces to final dimensions. Next, drill 9/32" holes in the back braces at the exact center-to-center distance of the hanger bolts. Sand the back braces, and then ease their edges, before removing the four wing nuts and installing the back braces in place. Add the four front wing nuts, stand the rack up and you're ready for laundry day.

I opted to leave this rack unfinished, as it doesn't need any protection, and I was worried that any colour may leach into the clothes on the rack during use. Water also might weaken a finish a bit quicker than normal.

Storing your laundry rack

To break the rack down to size quickly, remove the rear wing nuts and back braces, replace the rear wing nuts loosely, then loosen the four front wing nuts while supporting the rack with a hand. You can now lift one side of the rack upwards and it will fold together. This approach is perfect if you're going to be using the rack again in the next little while, and you have somewhere to store it in the mean time, as it only takes a few minutes to hide the rack out of sight.

When spring comes, and you want to store this rack in a smaller space, you can remove all the wing nuts, back braces and legs and it will be easier to carry and store for the season.

ROB BROWN

rbrown@canadianwoodworking.com



Rob's hoping this project will not only lower his hydro bill, but also help keep his house organized and please his wife.

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Carl Has Termites

What do you get when you mix termites and ants with water, a poorly made home and a clueless homeowner? If you're the neighbour, live entertainment.

BY DON WILKINSON

My neighbour Carl, has termites. Well, not Carl himself, although even that wouldn't surprise me. It's his house that has the termites. Normally that would be somewhat worrying but Carl isn't actually normal. Anyway, his house also has carpenter ants and the two species seem to be continually at war with each other and haven't yet found the time to eat his house. Besides, the only living thing in that house with any carpentry experience at all, are the ants. I'm quite sure I saw a little union sticker on a basement stud declaring them members of Local 238 of the BC (Before Carl) Carpenters Union. The termites, on the other hand, are members of the B.C. Government Employees Union.

Although I said that his house has termites, what I really should have said was that it "had" termites. It seems that there are some advantages to living in a poorly constructed house. In this case the advantage was with the basement's concrete floor and walls. It seems that the original builder hadn't considered using reinforcing mesh or rebar to add strength to concrete. He had also come up with a brilliant way to save on cement by adding just a little more sand to the mix than was called for. In addition he had tossed more than a few rocks from the nearby creek into the concrete forms to fill them up faster, which caused the floor to be a little lumpy and somewhat gritty as the sand leached out of the concrete mix.

In order to somewhat flatten out the floor, he constructed a wooden sub-floor on top of the lumpy concrete. What he should have done, other than tear the house down and start over, was first install some drain tile around the perimeter of the house, seal the concrete, put down a vapour barrier and then bolt or screw the 2 x 4's down. What he did do was... none of those things. This led to a problem, which in an ironic way, also turned out to be a bit of a mixed blessing when every spring, as the snow melted and the rains came, the basement flooded. The water poured in through the walls and surged up through the concrete floor. The wooden floor, which you may remember wasn't fastened down, began to float. As the water levels in the basement rose, the floor rose with it. Right up until it snagged on the electrical outlets attached to the walls. Then the flood waters continued to rise and inundated the floor, thus drowning the remaining termite colonies living in the joists that hadn't been electrocuted when the outlets shorted out. It was a rather intricate method to deal with a termite infestation but it did work. As an added bonus, the flooding solved his dry-rot problem as well. It became a wet-rot problem instead.

After studying the issue for a lot longer than it deserved, Carl came up with a brilliant solution. His theory was that if he dug a large enough hole beside one corner of the house, the water inside would seep back through the wall and into the

hole where it would be a simple matter to empty it using a bucket.

The first corner he chose to dig was where he discovered all the water from his entire roof was collecting before being dumped into a 45-gallon drum buried beside his foundation wall. Carl didn't entertain the notion that this could possibly be the source of his leakage problem and decided to commence his digging elsewhere.

At the local hardware store, Carl purchased at least one, and in a few cases two or more, of every variety of shovel known to mankind. He also bought a chainsaw, a polaski, a double-bit axe and an adze, all of which I promptly confiscated, partly to protect Carl from himself but mainly because I needed them more than he did.

For days I listened to Carl digging and cursing while he dug his way further into trouble. He hacked and chopped his way down through tree roots and into the boulder field originally installed instead of weeping tile. Apparently even Carl could eventually reach the bottom of a hole. The problem was, there was an aquifer at the bottom of it. And Carl had neglected to bring a ladder.

I'm seriously thinking of moving.

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Illustration by Mike Del Rizzo



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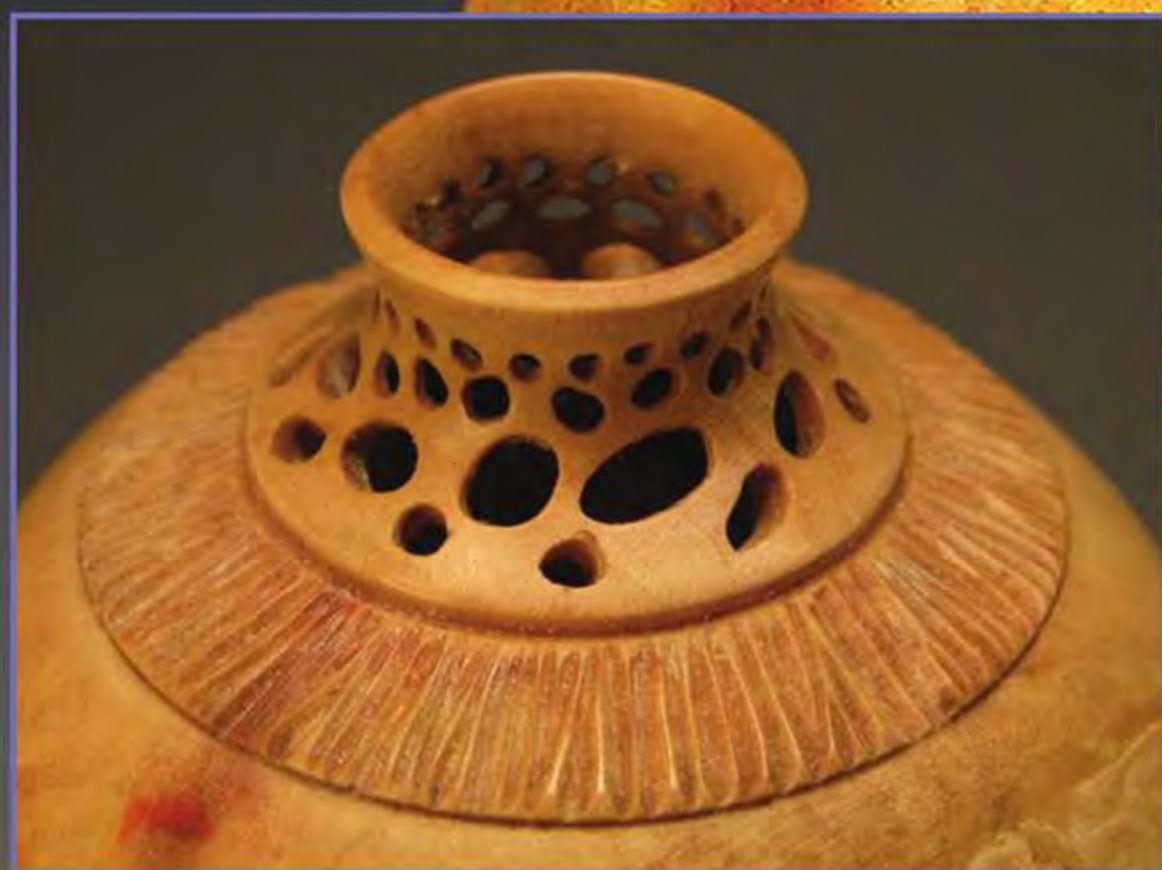
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Trent Watts

Manitoba Maple Vase

To allow easier hollowing Watts parted the top off this Manitoba maple vase, creating a mortise and tenon type union to reattach the top after hollowing. The flutes draw your eye away from the joint and add a design feature. "As I was doing the final turning of the top," Watts explains, "a worm hole appeared that was not visible before and created a visual distraction. My solution was to pierce more holes in a random pattern around the top to hide the single hole."

Turn to page 18 to read a collection of Trent's quotes.