

MASTER CLASS IN MOLDINGS: THE RIGHT TRIM FOR EVERY ROOM

FineHomebuilding

DESIGN • BUILD • REMODEL

Easy, elegant mantel

Secret to
a flawless
wiped finish

Choose the
right rigid foam

STEP BY STEP

Repair a wood
window sash

Inside a modern
mountain cabin

Install a
wall-hung toilet

MARCH 2018 NO. 273
FineHomebuilding.com





Design by Michael Rust – Architect LLC
Rendered in Chief Architect.
See more of this model online.



Download a Free Trial Version



Residential Design

Remodeling & Cost Estimating

Kitchen, Bath, & Interior Design

3D Design, Floor Plans, Elevations

Construction Drawings

CAD Tools & Section Details





Chief Architect[®]

Smarter Design Software

800.482.4433 • chiefarchitect.com/FreeTrial

72 LOW-IMPACT CABIN

FEATURES

COVER STORY

32 Easy, Elegant Mantel

Build a fireplace surround from one sheet of MDF and some stock moldings
BY JUSTIN FINK

39 Master Class in Moldings

An illustrated guide to the profiles and proper proportions of baseboard, crown, and casing
BY MARIANNE CUSATO

46 Restore a Wood Window Sash

When repairs are in order, a steam box, an easel, and two-part epoxy are your best friends
BY BEN BRUNICK

Tablet editions free to subscribers

Our new digital editions include all of the magazine's content, plus searchability and a host of interactive extras. Download the app at FineHomebuilding.com/apps. Access is free with your print subscription or FineHomebuilding.com online membership.



54 Installing a Wall-Hung Toilet

These fixtures save space and make your bathroom easier to clean, but installation demands a different workflow
BY ANDREW GRACE

58 A Better Wall for Production Builders

Meet NAHB's new wall assembly, with a 77% better R-value than a standard 2x4 wall
BY MATTHEW MILLHAM

61 Flawless Wiped Finish

For great results with wipe-on poly, you have to go beyond the instructions on the back of the can
BY RODNEY DIAZ

64 Get the Right Rigid Foam

Foam-board insulation can boost R-value, slow thermal bridging, and control condensation
BY MICHAEL MAINES



46

SAVE YOUR OLD WINDOWS



76

RUNNING CONDUIT

70 Should Your Next Dryer Be Ventless?

Condenser dryers don't make sense for every house, but are a great solution when venting isn't an option
BY KRISTINE KLEIN

72 Magnificent Mountain Cabin

Designed to tread lightly on the land and with minimal amenities, this family retreat is still built to last
BY ROB WOTZAK

76 Crash Course in Conduit

An electrician shares the basics of bending, fastening, and connecting electrical metallic tubing
BY CJ NIELSEN

64

KNOW YOUR FOAM



**SQUEAK-FREE[™]
GUARANTEE**

OUR WORD IS OUR BOND.



With a unique foam-to-gel formula, NEW AdvanTech[™] subfloor adhesive delivers a powerful panel-to-joist connection with a fast, easy application — even on wet or frozen wood¹. And when you combine it with the moisture resistance, strength and fastener-holding power of AdvanTech[®] subfloor panels, you get a subfloor assembly backed by the industry's only Squeak-Free Guarantee². And that's what makes AdvanTech[®] products the FLAT OUT BEST[™] choice for a quiet, stiff floor.

See it in action at AdvanTechSFA.com.

AdvanTech
SUBFLOOR ADHESIVE

¹ Exceeds ASTM D3498. ² Limitations and restrictions apply. Guarantee for panel-to-joist connection on an AdvanTech[™] Subfloor Assembly. Additional limitations and restrictions apply. See SqueakFreeGuarantee.com for details. © 2018 Huber Engineered Woods LLC. AdvanTech and AdvanTech logos and designs are trademarks of Huber Engineered Woods LLC. HUB 17659 08/17

IN EVERY ISSUE

8 **FINEHOMEBUILDING.COM**

10 **CONTRIBUTORS**

12 **LETTERS**

18 **TIPS & TECHNIQUES**

Hold-down bolts prepped right, Banding for notching logs, Secret to the ZipWall system, Foolproof paint ID, Safely carrying carpet tack strips

24 **TOOLS & MATERIALS**

Cordless saw fit for a framer, Perfect pencil sharpener, Soffit-vent solution, Cordless trim compressor

82 **PROJECT GALLERY**

84 **ASK THE EXPERTS**

Solutions for small moldings, shutoff that won't shut off, Pilot holes in a deck ledger

88 **MUSINGS OF AN ENERGY NERD**

Ten common mistakes made by new home builders

92 **DESIGN/BUILD**

Fireplace surrounds

94 **BUILDING SKILLS**

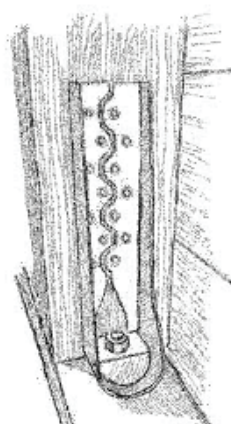
Cutting and joining plastic pipe

98 **KEEP CRAFT ALIVE**

Ben Brunick, woodworker

18

TIPS FOR
HOLD-DOWN
HARDWARE

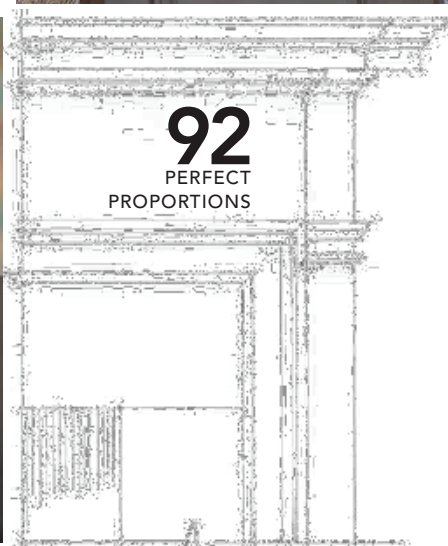


82 WALK-INS
THAT WOW



92

PERFECT
PROPORTIONS



94

JOINING
PLASTIC PIPE



24

CORDLESS
SAW IS A
WINNER



98 WOODWORKER



The Taunton Press
Inspiration for hands-on living®

ON THE COVER Justin Fink installs an easy and elegant fireplace surround. For more of this mantel build and installation, see pp. 32-38. Photo by Brian Pontolilo.

IT MATTERS WHAT
YOU'RE MADE OF.

©2018 Marvin® Windows and Doors. All rights reserved. ®Registered trademark of Marvin Windows and Doors.



Every homeowner wants a beautiful home that stands the test of time. Integrity Windows and Doors from Marvin are made with Ultrex® fiberglass, a material with outstanding durability and an amazing strength-to-weight ratio that outperforms vinyl and vinyl/wood composites. With sleeker window profiles and superior performance, our products are perfect for stylish traditional and contemporary homes.

Learn more at IntegrityWindows.com

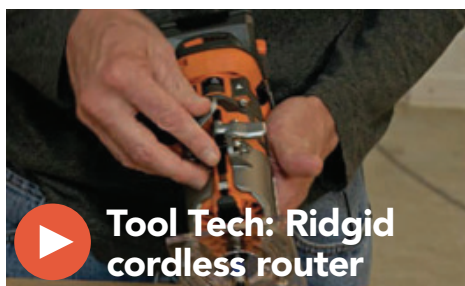
 **Integrity**
from **MARVIN**
Windows and Doors
Built to perform.®



Electrical retrofit for a garage workshop



Surface-mounted conduit enhances the functionality of a workshop, all without opening the walls.



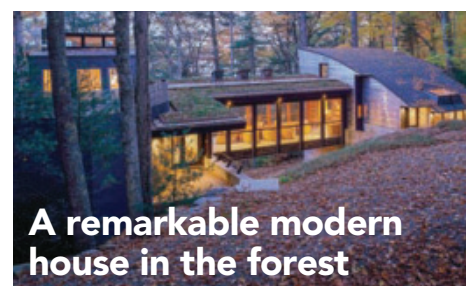
Tool Tech: Ridgid cordless router

Tired of being tripped up by the cord on your trim router? Then it's time to consider this 18v cordless option.



Episode 88: Air-seal that attic

The guys discuss the problems associated with warm, moist air leaking into a cold attic, and the best methods to fix the trouble.

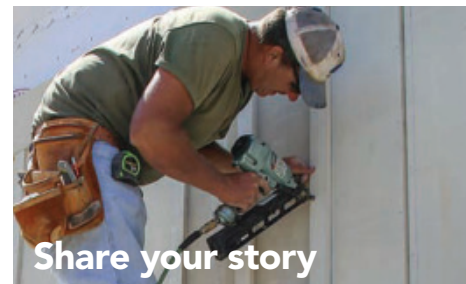


A remarkable modern house in the forest

In this innovative build, two separated "cabins" are connected by a glass and steel bridge containing the dining room.

Beautiful and abandoned farmhouse in North Dakota

The single, sharply pointed gable, delicate trim details, and porch of this abandoned structure have perfectly balanced symmetry and proportions.



Share your story

Submit your story on why you love building, and you could be featured in an upcoming episode of "Why I Build."



FineHomebuildingMagazine



@finehomebuilding



fhubmagazine



@fhubmagazine



finehomebuilding

A forest scene with a large tree trunk on the right and a shingled structure on the left. The shingled structure is made of brown composite shingles and is shaped like a cone. The background is a dense forest of tall, thin trees.

**HEADS WON'T JUST TURN.
THEY'LL SPIN.
GRAYNE'S NEW
7.5" SHINGLES.**

AS CLOSE TO REAL CEDAR AS IT GETS.

GRAYNE
ENGINEERED COMPOSITE SHINGLE

LIGHTWEIGHT & EASY TO INSTALL • MULTIPLE COLOR OPTIONS • AVAILABLE IN 5" WHITE CEDAR & 7.5" RED CEDAR • GRAYNE.COM

contributors

THE VOICES OF EXPERIENCE



BEN BRUNICK ("Restore a Wood Window Sash," pp. 46-53) got his start in woodworking in Lincoln, Neb., restoring highly prized Brunswick pool tables—including one for the White House. Ben is now in the midst of restoring dozens of wood windows on a historic building in Yankton, S.D. With the three-year project winding down, he is about to move his business, Chalkstone Woodworking, to a new shop in the heart of downtown Yankton.

MARIANNE CUSATO ("Master Class in Moldings," pp. 39-45) is renowned for her work on the Katrina Cottages and the New Economy Home. A member of the faculty at the School of Architecture at the University of Notre Dame, Marianne is also the author of two books on architecture and design. She is currently in the process of launching a new startup kit-home company that will design, manufacture, and supply the next generation of Katrina Cottages.



ROB WOTZAK ("Magnificent Mountain Cabin," pp. 72-75) has been a craftsman of one kind or another his whole life, working on everything from antique furniture and historic homes to wrought-iron railings and bronze sculptures. These days, he makes a living as a cabinetmaker, but he leaves time to write the occasional magazine article—a skill he honed during his six-year tenure as web producer for FineHomebuilding.com.

Raised in rural Alabama, **RODNEY DIAZ** ("Flawless Wiped Finish," pp. 61-63) was never a shrimp-boat captain or a college football All-American. But he did spend one long, hot summer hanging iron across the South with a crew of ne'er-do-wells, sparking an interest in building that ultimately led to a gig as *Fine Homebuilding's* deputy art director. When not shuttling his kids to Scouts, sports, and school, Rodney spends his free time renovating a 1942 Cape.



write an article

Fine Homebuilding welcomes articles from our readers. We'll acknowledge all proposals and return any we can't use, and we'll pay for any articles we publish. For details, check our website at FineHomebuilding.com.

FineHomebuilding

Editorial Director	Rob Yagid
Editor	Justin Fink
Executive Art Director	Robert Goodfellow
Design Editor	Brian Pontolillo
Web Producer	Michael Moran Alterio
Video Director	Colin Russell
Senior Editor	Patrick McCombe
Associate Editor	Matthew Millham
Social Media Editor	Matt Higgins
Copy/Production Editor	Samantha Streger
Deputy Art Director	Rodney Diaz
Administrative Assistant	Maureen Friedman
Manager, Video Studio	Jeff Roos
Editors at Large	Kevin Ireton Charles Miller
Editorial Adviser	Mike Guertin
Contributing Editors	Marianne Cusato Sean Groom Michael Maines Joseph Lstiburek
Contributing Writer	Scott Gibson
Contributing Photographers	Lincoln Barbour Ken Gutmaker Susan Teare Brian Vanden Brink
Executive Editor, Books	Peter Chapman

Editor,
Green Building Advisor Martin Holladay

Fine Homebuilding: (ISSN: 1096-360X) is published bimonthly, with a special 7th issue in the spring and a special 8th issue in the fall, by The Taunton Press, Inc., Newtown, CT 06470-5506. Telephone: 203-426-8171. Periodicals postage paid at Newtown, CT 06470 and at additional mailing offices. GST paid registration #123210981.

Subscription Rates: U.S., \$37.95 for one year, \$65.95 for two years, \$93.95 for three years. Canada, \$40.95 for one year, \$71.95 for two years, \$102.95 for three years (GST included, payable in U.S. funds). Outside the U.S./Canada: \$55 for one year, \$98 for two years, \$141 for three years (payable in U.S. funds). Single copy U.S., \$7.99. Single copy Canada, \$8.99.

Postmaster: Send all UAA to CFS. (See DMM 707.4.12.5)

Non-postal and Military Facilities: Send address corrections to Fine Homebuilding, PO Box 37610, Boone, IA 50037-0610

Canada Post: Return undeliverable Canadian addresses to Fine Homebuilding c/o Worldwide Mailers, Inc., 2835 Kew Drive, Windsor, ON N8T 3B7.

Printed in the USA



Designed for building. Designed for living.



Outdoor Accents®

Add beauty and strength to your outdoor projects. **Introducing Simpson Strong-Tie® Outdoor Accents® decorative hardware.** With multiple connectors to choose from and a classic black matte finish, you can customize your outdoor living space. This new line also includes structural screws that are easy to install and offer the look of bolts.

Outdoor Accents is available at select retailers and online at [homedepot.com](https://www.homedepot.com). Learn more at go.strongtie.com/outdooraccents.

SIMPSON
Strong-Tie

In Praise of Carpenters

How-to and design content are our bread and butter, but every once in a while we get an unsolicited piece of writing from a reader that begs to be shared with our audience. The below, from Newell Isbell Shinn—a production manager for South Mountain Company, a design/build firm in Martha's Vineyard, Mass.—definitely fits the bill. I hope you all enjoy it as much as we do.

—JUSTIN FINK, EDITOR

A CARPENTER'S INTIMACY WITH A BUILDING is particular and visceral. Carpenters know, for instance, how every material in a house smells when it is cut; what kind of dust it makes. They know how many pieces of each thing they can lift by themselves, how many with help, and the ratio of pieces moved

today to tomorrow's aches and pains. When they walk away, they know a building with their body in a way the occupants probably never will.

Carpenters wear layers, and rarely argue about whether to set the thermostat at 68°, 72°, or 76°. In fact, on those few halcyon days when temperatures stay in that neighborhood, it is cause for celebration. If eating your food on makeshift seating while exposed to the elements is a picnic, then the life of a carpenter is a picnic nearly every day.

Going to work as a carpenter may mean spending the day in a dank crawlspace, on a blazing rooftop, or in a Sheetrocked room with a million-dollar view. The material of the day may be heartbreakingly beautiful wood grain or back-breakingly awkward OSB and foam panels, and is usually beyond the carpenter's control; a result of decisions made elsewhere

and earlier by clients, architects, managers. Those decisions can feel capricious.

The work of making buildings is full of hazard, discomfort, and disappointment, and lends itself to a certain natural grumpy cynicism. Carpenters know every way in which reality as verified in the field can make a joke of plan, schedule, and budget. Carpenters have seen, or at least heard of, every way a beam or a machine can slash, crush, disfigure, or destroy a body, and they work in the shadow of them all.

Making buildings is hard work, but is also full of magic, spontaneous improvisational genius, and transformation. Carpenters do their work in a world that isn't square, level, or plumb when they get there, but is (mostly) when they leave. They are mechanics in the old, esteemed sense of the word.

Character is quickly evident in the way one walks across a cluttered deck, holds a tool and puts it down, and strikes a line. Carpenters must trust the person on the other end of a heavy load or the other end of the tape, and can therefore be quick to judge. They can also be patient, kind, and generous teachers. Everyone learns from someone else. Carpentry requires camaraderie.

At a time when fewer and fewer humans make anything of physical value, carpenters engage in a profoundly creative process, drawing on intellect, muscle, machinery, and materials to produce objects of lasting worth, to create shelter, to fulfill basic and quintessential human needs. The carpenter is in some ways midwife for the visions and dreams of others, bringing buildings into the world with all the attendant clamor, muck, and uncertainty of birth. It is hard work, and, done well, it is honorable, elegant, and inspiring, too.

—NEWELL ISBELL SHINN



A worthy lot in life. Building and remodeling houses is hard, and too-often thankless, work. Still, we wouldn't trade it for the world.

FineHomebuilding

Publisher Renee Jordan
 Advertising Sales Director Noelle Kennedy
 203-304-3530
 nkennedy@taunton.com
 Senior Account Manager/
 Integrated Media Northeast
 Kelly Ames Smith
 203-304-3840
 ksmith@taunton.com
 Senior Account Manager/
 Integrated Media Midwest/Northwest
 Kevin Draz
 630-568-3683
 kdraz@taunton.com
 West Coast Advertising Sales
 Diane Spangler
 714-839-6700
 dspangler@taunton.com
 Director of Digital Advertising Operations
 John Maher
 Advertising Sales Assistant
 Diana Edwards

Brand Marketing Director
 Cara Zenga

Marketing Manager Matthew Ulland

Single Copy Sales  MEDIAWORKS 360

Member  BPA
 BPA Worldwide BUSINESS



The Taunton Press

Inspiration for hands-on living®

Independent publishers since 1975
 Founders, Paul & Jan Roman

President & CEO Dan McCarthy
 CFO Mark Fernberg
 CTO Brian Magnotta
 SVP, Consumer Marketing Paula Backer
 VP, Controller Robert Caldaroni
 VP, Human Resources Carol Marotti

SVP, Home & Construction Renee Jordan
 SVP, Fine Cooking John Boland

Publishers of magazines, books, videos, and online
 Fine Woodworking • Fine Homebuilding
 Threads • Fine Gardening • Fine Cooking
 taunton.com

 **ABATRON**

Restoration & Maintenance Products

Solutions for your toughest projects

- Wood
- Concrete
- Metal
- Plaster
- Stone
- Porcelain



Free Catalog
1-800-445-1754 • www.abatron.com



More real than reality TV. A snapshot from Tyler Grace's recent article demonstrates how a real carpenter handles demolition.

■ your safety

Home building is inherently dangerous. From accidents with power tools to falls from ladders, scaffolds, and roofs, builders risk serious injury and even death. We try to promote safe work habits through our articles. But what is safe for one person under certain circumstances may not be safe for you under different circumstances. So don't try anything you learn about here (or elsewhere) unless you're certain that it is safe for you. Please be careful.

—JUSTIN FINK
editor

At last, a proper example of demo work

I was very pleased to read your recent article, "DIY Kitchen Demolition" (*FHB* #271). I've been telling people for years that what they watch on home-improvement shows is not an accurate portrayal of how demo work should be done. I would never take a sledgehammer to kitchen cabinets or throw concrete blocks through plate-glass sliding doors. That's just stupid and dangerous. Demo work is as important to the overall job as the trimwork.

—JEFFREY A. DAUGHERTY
via email

Dense-pack follow-up

I recently read the article "Dense Pack Done Right" (*FHB* #272) and feel compelled

to provide my feedback. It is not exactly clear how the complete roof assembly is constructed, but it appears to be an unvented assembly with the cellulose insulation directly in contact with the roof sheathing. This would not be permitted by the building code. Unless there is sufficient air-impermeable rigid insulation above the roof sheathing to prevent condensation, air-permeable insulation (i.e. cellulose insulation) in the cavities cannot be in direct contact with the roof sheathing.

—TOM REGH
via email

Don't put all your faith in the housewrap

I read "Better Board and Batten" (*FHB* #272) with interest, but I must take exception

with the author's statement, "These days, though, siding materials are usually more of a decoration than a barrier to the elements. The task of weather-proofing a home falls on housewrap, flashing, and other materials inboard of the siding."

There are some water-resistant barriers (WRBs) that are made to resist bulk water, such as for open-joint cladding, but the housewraps most commonly in use (and shown in the article) are made to resist incidental moisture only, and require drainage.

That said, the article seems to over-emphasize surface-applied sealants over craftsmanship. When the sealants fail within the next decade, wouldn't it be great for the craftsmanship (overlaps, slopes, drip edges, compression seals, etc.) to continue to protect the house for another hundred years?

—CHARLIE
via email

Correction

In "Musings of an Energy Nerd," *FHB* #270 ("Is your exterior rigid foam too thin?"), we printed an incorrect version of this table from the International Residential Code that gives the minimum R-value for the rigid-foam layer in 2x6 walls. The correct version appears below.

Zone	2x6 wall
Marine Zone 4	R-3.75
Zone 5	R-7.5
Zone 6	R-11.25
Zones 7 and 8	R-15



Email your own letter to us at FH@taunton.com.

Fine Homebuilding

To contact us:

Fine Homebuilding
63 South Main Street
PO Box 5506
Newtown, CT 06470-5506

Send an email:

fh@taunton.com

Visit:

finehomebuilding.com

To submit an article proposal:

Write to *Fine Homebuilding* at the address above or
Call: 800-309-8919
Fax: 203-426-3434
Email: fh@taunton.com

To subscribe or place an order:

Visit finehomebuilding.com/fhorder
or call: 888-304-6044
9am-9pm ET Mon-Fri; 9am-7pm ET Sat

To find out about *Fine Homebuilding* products:

Visit finehomebuilding.com/products

To get help with online member services:

Visit finehomebuilding.com/customerservice

To find answers to frequently asked questions:

Visit finehomebuilding.com/FAQs

To contact *Fine Homebuilding* customer service:

Email us at customerservice@finehomebuilding.com

To speak directly to a customer service professional:

Call: 888-304-6044
9am-9pm ET Mon-Fri; 9am-7pm ET Sat

To sell *Fine Homebuilding* in your store:

Call us toll-free at 866-452-5179, or
email us at tradecs@taunton.com

To advertise in *Fine Homebuilding*:

Call 800-309-8953, or
email us at fhads@taunton.com

Mailing list:

We make a portion of our mailing list available to reputable firms. If you would prefer that we not include your name, please visit:
finehomebuilding.com/privacy
or call: 888-304-6044
9am-9pm ET Mon-Fri; 9am-7pm ET Sat

For employment information:

Visit careers.taunton.com

The Taunton guarantee:

If at any time you're not completely satisfied with *Fine Homebuilding*, you can cancel your subscription and receive a full and immediate refund of the entire subscription price. No questions asked.

Copyright 2018 by The Taunton Press, Inc. No reproduction without permission of The Taunton Press, Inc.



M. TEIXEIRA SOAPSTONE

DOMESTIC AND IMPORTED SOAPSTONE
FOR HOME & COMMERCIAL APPLICATIONS

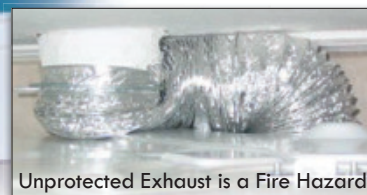
ASK US ABOUT OUR
DIY COUNTERTOP PROGRAM.

SOAPSTONES.COM • 877-478-8170 • WE SHIP NATIONWIDE
SHOWROOM LOCATIONS • NEW JERSEY • VIRGINIA • DENVER • SAN FRANCISCO



Give the Dryer Some Space

Room to Breathe



Unprotected Exhaust is a Fire Hazard

Standard Installation Model 480 | 22 Gauge Aluminized Steel—Shown Painted

New Dryerbox® Model DB-480

Larger receiving area handles stand-alone AND pedestal dryers.

the dryerbox®

Today, you can place the dryer flush to the wall without crushing exhaust hose or otherwise restricting airflow. Install the Dryerbox for safer, roomier and more efficient homes.

888-443-7937

www.Dryerbox.com

Putting on the Final touches

We've wrapped up ProHOME 2017. Check out the final coverage from the jobsite in Wilder, Vermont, to see how we balanced affordability and energy efficiency in an eight-home production build.

Then get ready for our California project in 2018!

FineHomebuilding

PRO HOMETM

Elevating the Standard of Building



See the final home. [FineHomebuilding.com/prohome](https://finehomebuilding.com/prohome)

THANK YOU TO THE SPONSORS OF THE 2017 PROHOME



Boral TruExterior
Siding & Trim



always
around you



THANK YOU FOR YOUR DONATIONS TO THE 2017 PROHOME



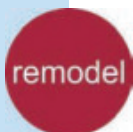
International Builders Show booth W5271



design | 3D | materials lists

"... you guys got this right, the program is awesome...
SoftPlan is the best and I have used them all..."

Andrew Bozeman, Montgomery, AL



SoftPlan remodel

kitchens | baths | additions | \$985

SoftPlan remodel 2018 coming soon

free trial: www.softplan.com or 1-800-248-0164

Software That Passes Inspection With Home Inspectors.

HomeGauge is packed with features to make your job easier, and to help you get it done faster. Customize templates, add pictures and video in a snap, and manage your business – all with HomeGauge's industry leading software, services, and support!

“

My transition from a hand written report to the computerized report has been so much easier than I could have ever hoped, and I believe it is directly related to your designers, tech guys, and your staff in general.

—Home Inspector in Louisville, KY

”

Inspect it for yourself!

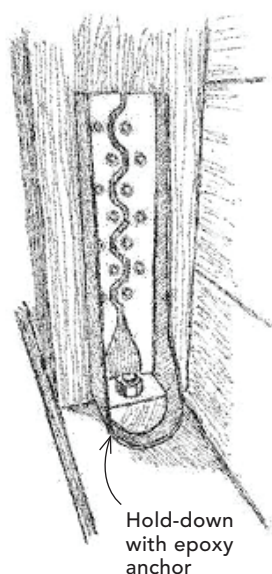
Try HomeGauge software

FREE for 30 days at HomeGauge.com



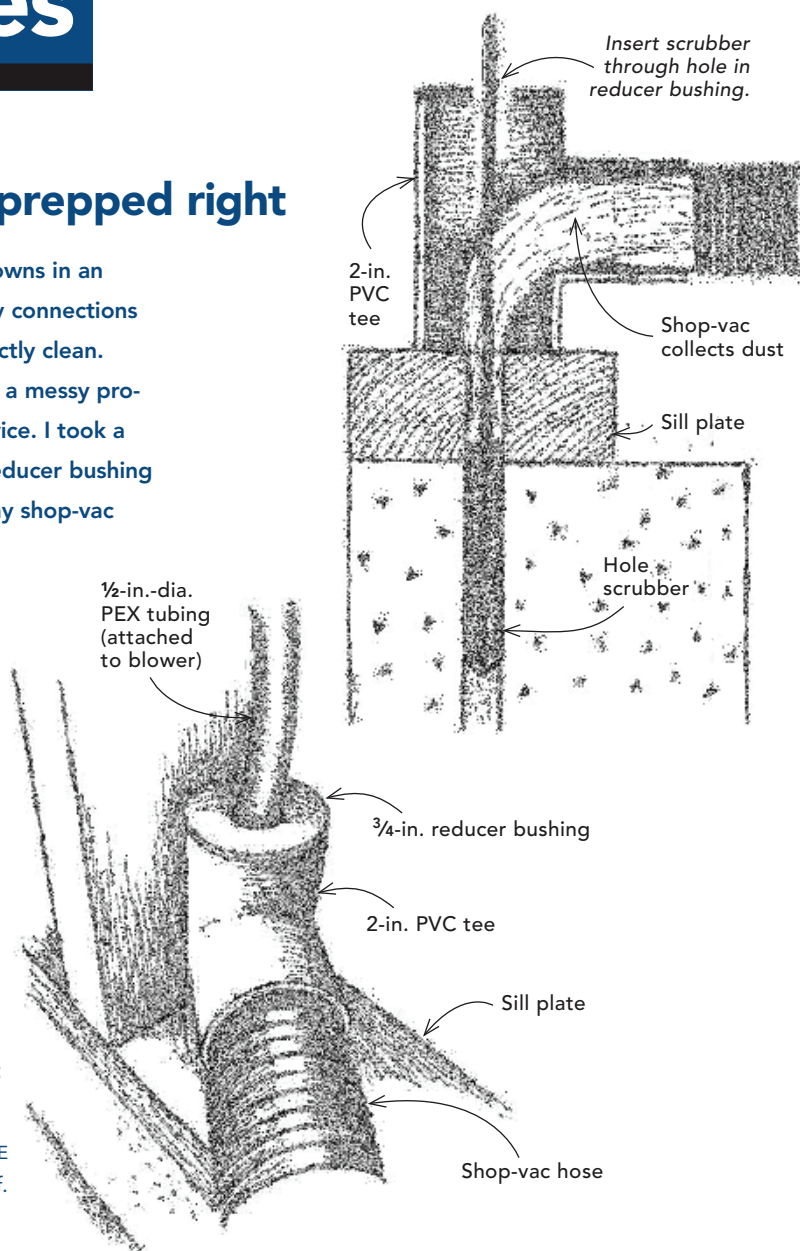
HomeGauge.com | 828-254-2030

Hold-down bolts prepped right



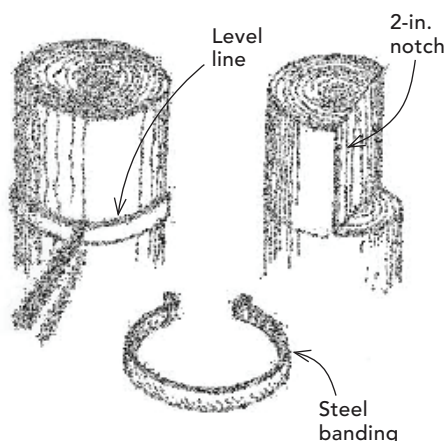
I recently added earthquake tie-downs in an occupied basement. For the epoxy connections to work, every hole must be perfectly clean. Blowing the dust from the holes is a messy process, so I made a dust-capture device. I took a 2-in. PVC tee and added a $\frac{3}{4}$ -in. reducer bushing on one end. The tee attaches to my shop-vac hose and is placed over the hole. Into the $\frac{3}{4}$ -in. fitting I inserted a $\frac{1}{2}$ -in.-dia. piece of PEX tubing attached to my cordless Makita blower. I used a handheld blower instead of a compressor so there would be no chance of oil being forced into the hole. With the shop-vac running, I blew the hole out and captured the dust with the shop-vac. I did the same with the scrubber, alternating between scrubbing and blowing until the hole was squeaky clean. For about \$3, this system works great.

—SCOTT GILLESPIE
Richmond, Calif.



submit a tip

Tips & Techniques is a forum for readers to exchange information about methods, tools, and jigs they've devised. We'll pay for any we publish. Send details to Tips, *Fine Homebuilding*, P. O. Box 5506, Newtown, CT 06470-5506, email them to us at fh@taunton.com, or upload them to FineHomebuilding.com/reader-tips.



Banding helps lay out log rail

I was recently called upon to replace a worn-out deck railing for a log cabin. The posts were made from 6-in.-dia. logs and I needed to notch them so I could fasten them to the rim joists of the deck. As I was trying to figure out a way to put a level line on the log's round surface, I spotted some steel banding that had held together a material delivery. I cut a section of the banding down to just a little longer than the circumference of the logs, and used my hands to put a soft bend all the way around the band so it would match the shape of the log. My improvised tool made it easy to trace a straight line around the post, over and over again.

—CURT LYONS
Fort Collins, Colo.



CROWNPOINT CABINETRY

Complimentary design service

No cost job-specific client samples

No charge blanket-wrapped job site delivery

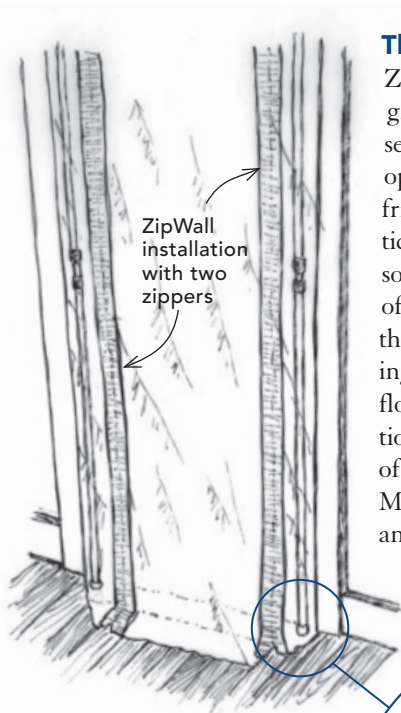
www.crown-point.com

800-999-4994

Handcrafted in New Hampshire

Available direct, nationwide

Industry leading on-time delivery



ZipWall installation with two zippers

Pushpin secures plastic to floor

The secret to the ZipWall system

ZipWall dust-containment systems are great, but I think I have improved the self-adhesive zipper opening. I used to open a zipper with one hand, but the friction can cause the pole-mounted plastic “wall” to shift while unzipping. My solution? I like to pin the stationary part of the plastic adjacent to the opening to the floor with a pushpin to ease the opening procedure. It leaves a tiny hole in the floor, which, depending on the application, can be ignored or filled with a touch of furniture wax. I always have my full Mohawk wax set on hand, which can fill any little hole with ease.

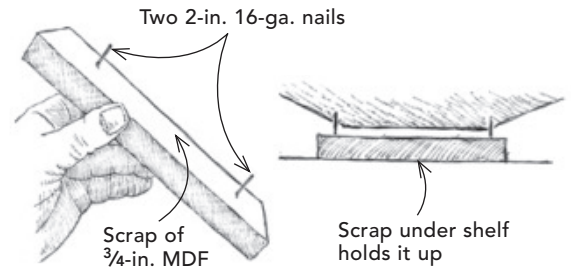
—ANDY TOMLINSON
Mystic, Conn.

Foolproof paint ID

I am a builder/remodeler and most of my work comes from repeat clients. Often when I get back to a past project to do an update or additional remodeling, I’ll need to match the existing paint. It’s easy to lose track of customers’ final selections and homeowners can’t be relied on to save paint cans. Even if you have a list of selections, it can be difficult to know exactly which paint went where.

To make it easier to track down the right paint in the future, I now have my painter remove the light-switch cover plate closest to the door, write all the paint and manufacturer details, including the sheen, on a piece of painter’s tape, and place it on the back of the plate. When it comes time for remodeling, we remove the cover and have all the info we need for a perfect match. This method has saved us so much time and eliminated many gallons of mismatched paint.

—BUZZ BENTIVEGNA
York, Pa.



Two 2-in. 16-ga. nails

Scrap of 3/4-in. MDF

Scrap under shelf holds it up

Painting rack

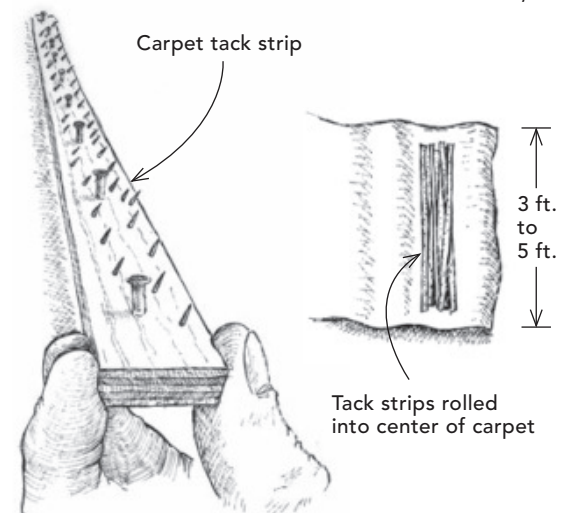
I had a bunch of shelves that I needed to paint and I wanted to make disposable drying stands for them. I had some MDF cutoffs, and shot a pair of 2-in. 16-ga. finish nails through them. I found that four nails—two at each end—were plenty to support the shelves while they dried.

—ELI GLUCK
Brooklyn, N.Y.

Vinyl tape and PVC cement

I use vinyl electrical tape for all sorts of things, such as wrapping tool handles for a better grip and repairing extension cords. It doesn’t matter whether you tear or cut the tape when you’ve finished wrapping—it inevitably starts to unravel. I solve this problem by dabbing a drop of plumber’s PVC cement on the very end of the tape as I finish the wrap. This welds the tape’s end and prevents future unraveling.

—J. KAYE
Phenix, Va.



Carpet tack strip

3 ft. to 5 ft.

Tack strips rolled into center of carpet

Safely carrying carpet tack strips

Carpet tack strips are a hazard. They always find a way to cut you, until they finally make their way to the landfill. But I have found a way to mitigate their damage. When I remove the carpeting, I reserve a short piece and have everyone lay the tack strips at one end, as shown in the drawing. When the carpet is loaded with the strips, I simply roll the carpet up and secure the roll with shrink wrap or tape.

—BRIAN FLYNN
Overland Park, Kan.

THANK YOU, RAIN.

This year we're celebrating our 150th anniversary and we'd like to take a moment to thank the rain. Most people would expect us to thank our customers, but our customers aren't the only reason we're in business.

If it were up to them, rain would be this magical thing that evaporated the second it hit cladding, never to cause a single problem. But in reality, rain just makes a mess. Without all of that pesky moisture, there'd be no need for premium products like ours that protect homes from rot and water damage. So thank you, rain, for all that you've done for us since 1868. You're still the headache that we're tackling head on.

And to our customers, we're thankful for you, too. Just as we've made it our mission to help you build better, you've helped us build a better company.

Here's to the next 150 years.

Thanks.

Benjamin P. Obodyke

**BENJAMIN
OBDYKE**
roof & wall products

Jane DeWitt
STONEMASON

WHY I BUILD

THE VOICES OF CRAFTSMANSHIP

A NEW VIDEO SERIES PRESENTED BY

FineHomebuilding®

Introducing “Why I Build,”
a new video series that
celebrates the professional
craftsman, with personal
stories from builders like you.

Submit your story and view all the episodes at
FineHomebuilding.com/WhyIBuild

SUPPORTED BY



PRO



CabParts®
Custom Casework Manufacturing

cabparts.com

1.888.398.1802

OUTSOURCE

Cabinet boxes, closet components & more
Order exactly what you need — no minimums

30 years delivering QUALITY & SERVICE



A Breath of Fresh Air from COR-A-VENT®

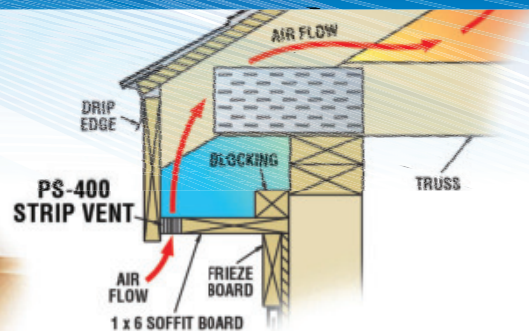


Available in black,
white or tan

Stainless Steel
(Type 304) staple option
for use in marine or other
corrosive environments

OFFICIAL 2016 SPONSOR

Fine Homebuilding
PRO HOME
Elevating the Standard of Building



Why use COR-A-VENT soffit vents?

- Superior airflow – 10" NFVA per lineal foot*
- Fit in narrow spaces where other vents can't
- Crush resistant – install with a power nail gun
- Easy to hide for concealed installation
- Self-cleaning – won't clog with dirt or debris
- Available in black, white or tan

*Net Free Vent Area per lineal foot

COR-A-VENT®
INCORPORATED

P.O. Box 428 • Mishawaka, IN 46546-0428 / Phone: (800) 837-8368 / Fax: (800) 645-6162
See and download application details from our website - www.cor-a-vent.com / Email - info@cor-a-vent.com

CORDLESS SAW FIT FOR A FRAMER



Makita Cordless Circular Saw (XSR01)

Blade diameter:

7 1/4 in. (round arbor)

Cutting capacity:

2 9/16 in. at 90°

Max. bevel: 53° with

stops at 22.5° and 45°

Price: \$200 (tool only);

\$350 (kit with batteries and dual-port charger)

Currently, most of my carpentry work is building decks, but as a former framer I've always used blade-left worm-drive saws because of their extra reach and great visibility of the cutline. Like most contractors, I'm always trying to maximize efficiency. I use cordless tools whenever possible, because they're just more convenient. Makita recently introduced the XSR01, a cordless, rear-handle, blade-left circular saw with a compact brushless motor. It's not technically a worm-drive saw, but it's arranged like one, and it uses two 18v batteries so it has more run time than a conventional cordless saw. I bought one shortly after it was released because to me it seemed like the perfect cordless saw.

Although it's a little heavier than I'd hoped (12 lb. when loaded with a pair of 5-amp/hr. batteries), so far it's been excellent at cutting everything I've thrown at it—composite decking, PT stair stringers, and even steel deck framing. The cutting depth is easy to adjust, the rafter hook is top notch, and a fuel gauge on the top tells you how much battery life remains. I've been very satisfied with this saw and feel no difference in power between it and my corded worm drive. I even think it would be an excellent full-time framing saw.

Robert Shaw, a deck builder in Colorado Springs, Colo.



Perfect pencil sharpener

It's the simple tools that are the hardest to improve, but the Kum Long Point Pencil Sharpener is a definite step up from a standard sharpener. The tool has a pair of holes designed for two-stage sharpening. The first hole shaves away the wood, leaving the pencil lead untouched. The second hole shaves just the lead, leaving an incredibly sharp point. The two-stage setup is excellent for builders because it allows the user to tailor the pencil tip to the job at hand. Step one yields a snub-nosed lead suitable for framing. For a fine line for finish carpentry, include the second step. At around \$5, it's hard to beat.

Justin Fink, editor





DOGS DROOL



**YOUR ADHESIVE
SHOULDN'T**

When adhesive continues to drool or flow from the cartridge after use, it's a mess and a waste. And wasted adhesive is money lost. Fortunately, Titebond Fast Set eliminates this annoying and costly problem.

See the side-by-side comparison story at titebond.com/NoDrool

**FAST
SET**
POLYURETHANE
ADHESIVE



Soffit-vent solution

In an effort to keep the run as straight and short as possible and make their lives easier, many builders route a bath fan's ductwork to the soffit. Unfortunately, typical fan outlets for soffits don't work very well because the vent is connected by the soffit installer, who needs extra length in the duct to allow it to be pulled down, terminated, and then pushed back into place. This extra hose leaves twists and turns in the ductwork, reducing airflow. A simpler solution is the EZ Soffit Vent, distributed by Panasonic. The polypropylene vent has a smooth shape for maximum airflow, and is installed at the same time as the fan, so the duct can be pulled tight for peak efficiency. Complete with a paintable grill, the EZ Soffit Vent is \$25 and made for 4-in. ductwork. Designed by Wisconsin energy consultant Joe Nagan, it's easily one of the best problem-solving building products to come across my desk in recent memory.

Patrick McCombe, senior editor

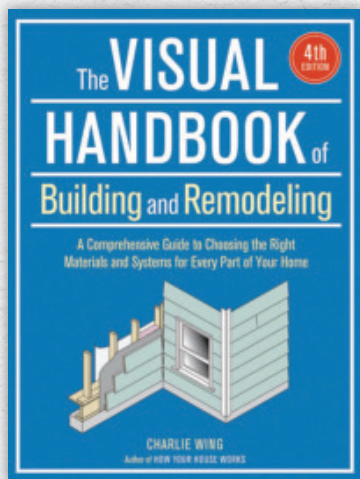


Full flow. The EZ Soffit Vent is sturdy, easy to install, and better at moving air than other soffit-mounted fan outlets.

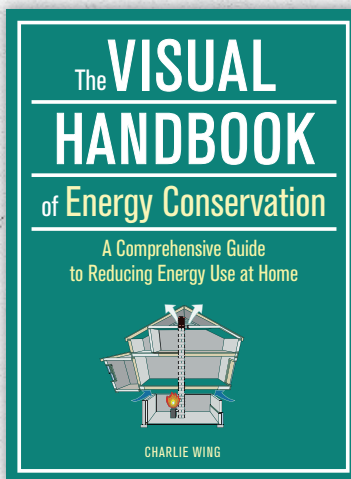
Photos: courtesy of Joe Nagan

BOOKS *for* Builders

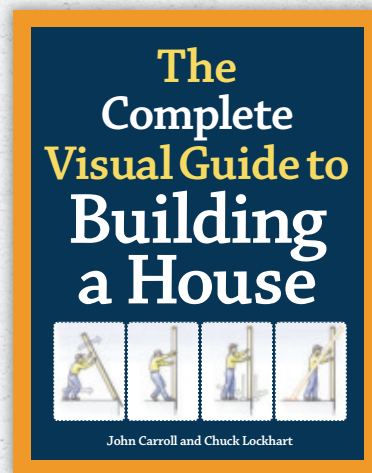
From the publisher of *Fine Homebuilding*



NEW 4th edition The Visual Handbook of Building and Remodeling



The Visual Handbook of Energy Conservation



The Complete Visual Guide to Building a House

Available at TauntonStore.com and in bookstores now

THE **FUTURE** OF **BOMB** SHELTERS

ATLAS SURVIVAL SHELTERS

"NOW OFFERS"



STARTING PRICES

\$9,999 - \$18,999

INCLUDES AIR SYSTEM



DEALERS WANTED
1-855-4-BUNKER
IWANTTHATSHELTER.COM



BE A BETTER CRAFTSMAN WITH **GREX® 23 GAUGE HEADLESS PINNERS**



Be a better craftsman with proven precision built GREX tools. It's the same award-winning robust build quality that users have trusted in GREX tools for over 20 years. And GREX continues to lead the industry's innovation of 23 Gauge Headless Pinners. Don't be fooled by look-alikes. The difference really is in the details.



ALSO COMING SOON
GREX. CORDLESS 2" 23 GAUGE HEADLESS PINNER



FIND YOUR DEALER

🇺🇸 888-447-3926 🇨🇦 866-633-7788

www.grextools.com/pinners

Trim compressor cuts the cord

Ridgid has a new cordless air compressor (R0230) with a number of innovative features: a brushless motor, a slick layout, quiet operation (80 db.), and the ability to run off either one or two 18v batteries. With two 5-amp/hr. batteries, Ridgid claims you can drive 1200 finish nails on one charge. I've never had occasion to test that claim, but I did use it for a full day of trimwork without draining the batteries. With only a 1-gal. tank, this compressor is designed for finish work, not framing—I could only fire three or four framing nails before the pump cycled.

At just under 20 lb., the Ridgid is lighter than my corded 1-gal. Senco PC1010, and I like the tank arrangement better. I only wish there were an option to run off AC when convenient. That said, I think this is a brilliant, albeit somewhat specialty, tool. For about \$200 without batteries, I'd recommend it to any carpenter looking to lighten their load.

Steven Smith, a remodeler in Seattle, Wash.



Photos: courtesy of Ridgid

ZIPWALL®

DUST BARRIER SYSTEM

800-718-2255

Do it right.

Start every job with ZipWall®.

- Sets up in just a few minutes – brings in business for years
- No ladders, no tape, no damage

See how easy it is at zipwall.com.



EXOTIC WOOD TO MAKE YOUR HOME EXTRAORDINARY

**FREE
SHIPPING**
ON ORDERS OVER \$1500*



ADVANTAGELUMBER.COM®

Buffalo, NY | Grover, NC | Santa Fe Springs, CA | Sarasota, FL | Belém, Brazil

Decking • Deck Tiles • Siding • Beams • Flooring • Turning Blanks • Live-Edge Slabs • Custom-Sawn Lumber

*Free shipping offer requirements: \$1500 minimum US order. \$3000 minimum Canadian order. Not to be combined with other offers. Valid only in the contiguous US and select Canadian regions. Full details: AdvantageLumber.com



Faster, Thinner Floor Warming

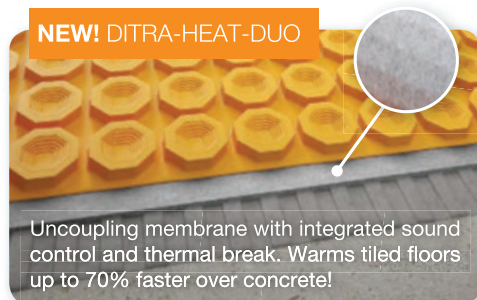
Schluter®-DITRA-HEAT

Electric floor warming system with integrated uncoupling

Floor warming systems have become very popular. Heating tiled floors increases the need for uncoupling to prevent cracked tiles and grout. Use DITRA-HEAT to get both – warm floors and uncoupling – in a single layer.

- No self-levelers required to encapsulate heating cables (no need to wait for curing)
- Place the heating cables exactly where they are needed, without clips or fasteners
- Combines the flexibility of loose cable with the ease of installation of a mat system
- 120 V and 240 V options
- Programmable and non-programmable thermostats available

NEW! DITRA-HEAT-DUO



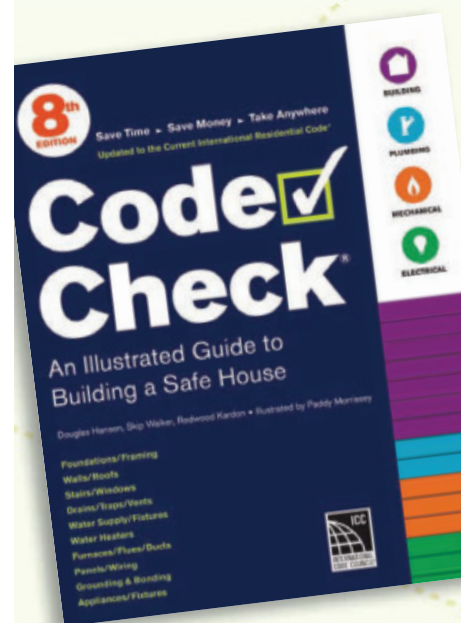
Uncoupling membrane with integrated sound control and thermal break. Warms tiled floors up to 70% faster over concrete!



www.schluter.com

We stand behind our products.
For full warranty details, please visit schluter.com/warranty.

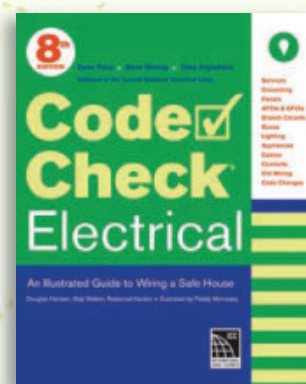
NEW 8TH EDITION



Updated for 2017

An essential resource for
builders, remodelers, and
home inspectors.

Also available & fully updated



Available at TauntonStore.com

FULLY UPDATED FOR 2018

120+

REVIEWS ON
PRO-TESTED
tools & accessories



**Don't buy
another tool
until you've read
the review in the
2018 Tool Guide.**

On newsstands now,
or order online at:

Tauntonstore.com/toolguide

Add FineHomebuilding to your tool set

Become a member and get instant access to thousands
of videos, how-tos, tool reviews, and design features

Start your **FREE** trial at Finehomebuilding.com/2join



Repair. Restore. Reinforce.

FibaFuse® Paperless Wall Repair Fabric

No more time-consuming tearouts!

Restore a damaged wall with
FibaFuse 36" Wall Repair Fabric

- Plaster damage
- Drywall damage
- Wallpaper removal damage
- Large cracks/alligator cracks

Visit www.fibafuse.com for how-to
videos & application instructions.



FibaFuse® is a registered trademark of
Saint-Gobain ADFORS ©2017 Saint-Gobain ADFORS



Easy, Elegant Mantel

Build a fireplace surround
from one sheet of MDF
and some stock moldings

BY JUSTIN FINK



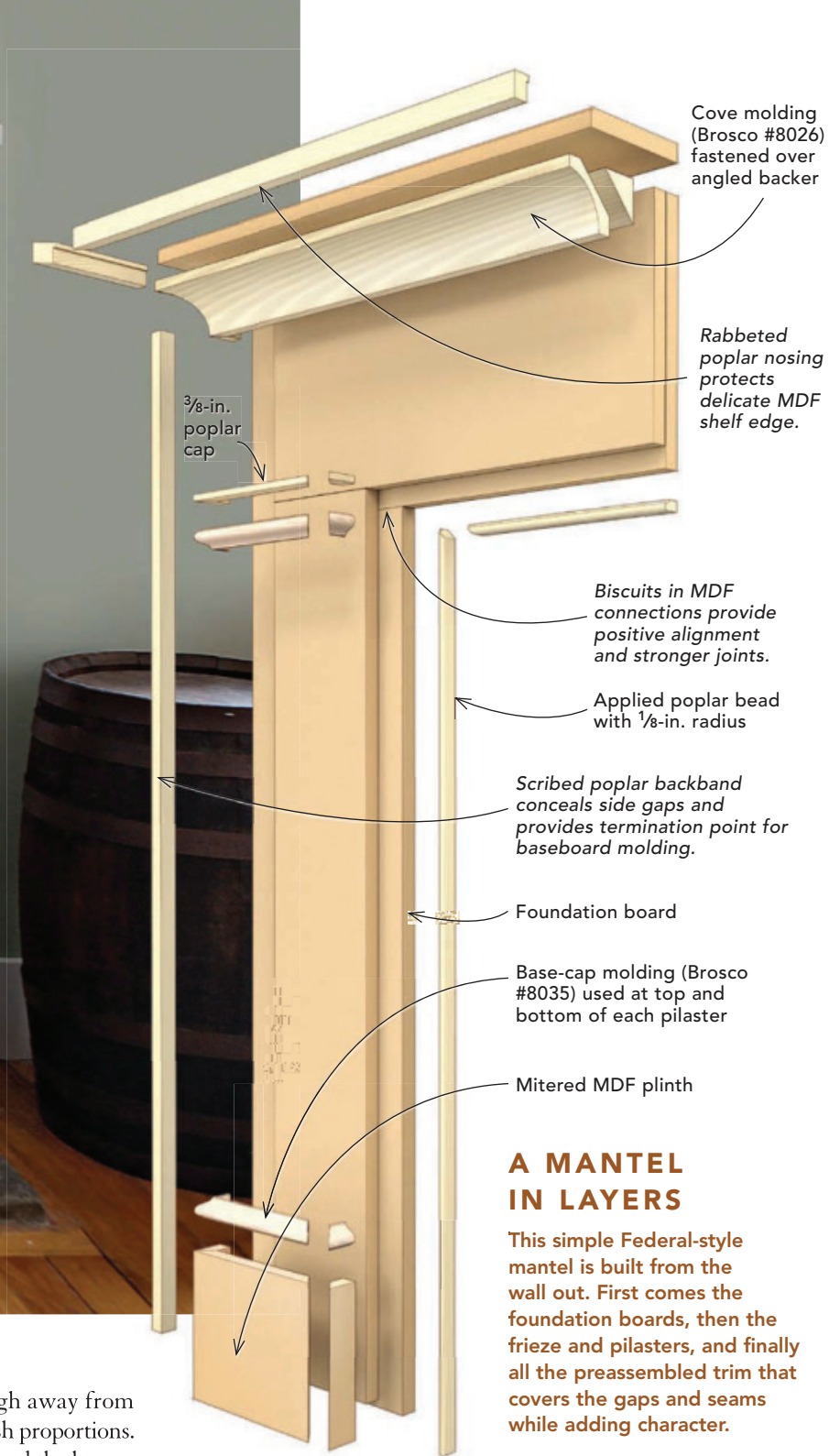
Fireplace surrounds—better known by the more commonly used term *mantels*—are a finish carpenter’s playground. They’re a relatively small, cleanly contained opportunity to create a centerpiece that shows off our craftsmanship, lets us exercise our eye for proportions and design, and, for better or worse, gives us a chance to pile on the moldings. But not every mantel job has a big budget, and that often leads to unimaginative design and execution, or worse, a cookie-cutter, factory-produced, prefab option. But with a bit of creativity, even a modest-budget living room can be finished with an elegant fireplace surround. All you need to build the mantel shown here is about \$125—enough for a sheet of $\frac{3}{4}$ -in. MDF, some 1x poplar, and a couple sticks of stock molding.

As far as trim-carpentry projects go, this one is fairly straightforward. The work can be done in a shop, as it was for this project,

or right on site. The tools aren’t specialized, and in most cases can be chosen based on what is already in your arsenal. For instance, I’d be just as comfortable joining boards with floating tenons as I was using biscuits, and even though I used a tracksaw to cut the MDF parts, a well-tuned tablesaw would also work.

The dimensions of the assembly shown here are based on a simple Federal design by woodworker Mario Rodriguez, which appears in his excellent book, *Building Fireplace Mantels*. I scaled the parts and customized the assembly to fit the room where the mantel was installed, but before you go too far down the path of designing, it’s important to consider the restrictions of the building code.

The code is not difficult to satisfy (see drawing right), but fireplaces in old houses don’t always mesh with modern code standards. The problem is that the masonry around the firebox often isn’t wide



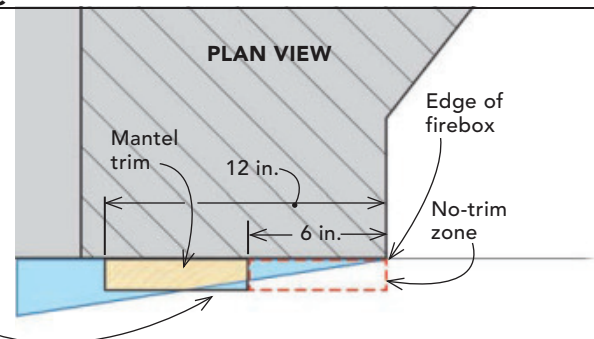
enough to accommodate a mantel that's set far enough away from the firebox to meet code—at least not without cartoonish proportions.

Luckily, the fireplace in this house is nonfunctional, and the homeowners simply wanted a decorative surround as a focal point. But if the fireplace had been operational, I would have scaled up the entire surround to maintain the mantel proportions, and then covered the brickwork with slabs of stone or tile that extend onto the surrounding drywall as far as necessary to cover the gap between the firebox and the mantel foundation boards. Finally, keep in mind that clearance rules for manufactured fireplace inserts and stoves supersede the building codes, and may be stricter. □

Justin Fink is editor of *Fine Homebuilding*. Photos by Brian Pontolilo, except where noted.

Know the code

Combustible trim between 6 in. and 12 in. from the edge of the firebox can only project 1/8 in. per inch. Anything projecting beyond that imaginary line won't meet code.



START WITH A SOLID FOUNDATION

The foundation boards of this mantel have two roles. First, they create a visual backdrop for the entire fireplace surround, helping to ground the design. Second, they act as a flat, plumb surface in an assembly that is rarely so. This allows the rest of the parts of the mantel to attach regardless of the condition of the wall.



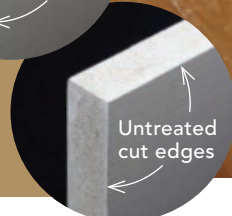
All from a single sheet. All of the MDF parts for this project come from a single 4x8 sheet. They are first broken down by width using a tracksaw, then taken to the miter saw to be cut to length.



Biscuits for alignment. The three pieces that make up the foundation assembly are joined together in place rather than installed as one piece. To ensure flush joints that stay tight, the parts are slotted for biscuits and glue-sized before installation.



Glass-smooth edges in MDF One of the downsides to working with MDF is that, if left untreated, the porous fibers exposed by sawcuts are difficult to finish smoothly. I used to rely on spackle to smooth these problematic edges, but more recently switched to glue-sizing the edges instead. Glue-size is essentially watered-down yellow glue that's brushed or rolled onto the edges of the board, where it soaks into the wood fibers and hardens. I find that a couple of passes with this watery glue solution (allowing for dry time between coats) followed by light sanding, then shellac-based primer, will result in a surface that's smooth to the touch.



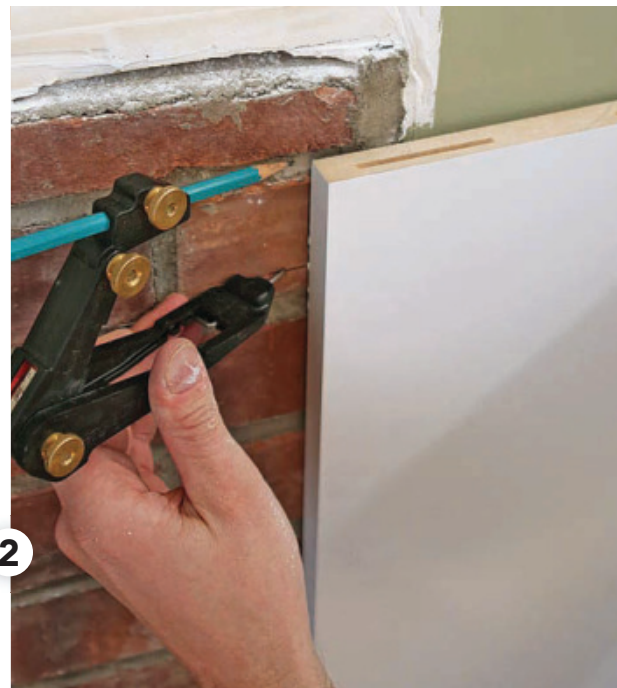
SIMPLE SCRIBING

1



Plumb and level. After measuring the setback from the edge of the firebox to where the inside edge of the foundation boards will land, use a pencil to strike dead-level and plumb lines across the masonry.

2



Get set to scribe. After aligning the inside edge of each vertical foundation board to its plumb line, set your scribes to equal the distance from the top of the board—which is left longer than necessary—to the level pencil line on the masonry.

3



Mark the bottom. Still holding the extralong foundation board in position, trace the contours of the hearth onto the bottom face of the board. Once cut away, the board will fit at the bottom and be in alignment at the top.

4



Beveled for a tight fit. Cut along the scribed line using a jigsaw set to a slight undercutting bevel, taking the back edge of the board out of the equation to ensure the front sits tight to the hearth.

AN EASY FIT, EVEN ON WAVY WALLS

At just $\frac{3}{4}$ in. thick, the foundation boards don't leave room for scribing to meet the wall. Instead, focus on getting the foundation boards plumb and in plane with each other, then cover the gaps with a scribed shelf on top and backbands on each side.



Pry it plumb. Once the glue sets, the foundation boards will act as a single unit. At this point, it can be pulled away from the wall as much as necessary to get it plumb before adding a few more finish nails through and into the framing around the masonry.



One-piece frieze.

Prefabbed in the shop to include the cove molding installed over an angled backer, the frieze and cove molding can be set as a single piece. Center it on the horizontal foundation board, align it flush along the top edge, and fasten it with finish nails.



In and up. Left just short of full length to allow for an easy fit, each pilaster gets glue and biscuits along the top edge before being slid up tight to the underside of the frieze. The gap at the bottom will be covered by the base detail.

Easier backbands. After scribing and cutting the beveled edge of an extrawide piece of poplar to fit the wall on each side of the mantel assembly, mark where it overlaps the face of the foundation boards. Add $\frac{1}{8}$ in. to this marked line to create a slight reveal and cut along the line using a tracksaw.





Hide the top. After scribing the mantel shelf to fit any waves in the wall, set it in place and fasten it down to the frieze assembly with finish nails.



A stronger shelf. The MDF mantel shelf is likely to take abuse, and therefore demands a hardwood nosing. To ensure alignment and help provide positive fastening, use a tablesaw to cut both shelf and nosing with nesting rabbets, leaving a slight reveal on the top and bottom to create a nice shadowline and eliminate the need for sanding in place.

MOLDINGS MAKE A FINISHED MANTEL

Moldings can be mitered and fastened to the mantel piece by piece, but preassembling them is a better approach. When the focus is on joining each piece of molding to another rather than to a substrate, you end up with strong assemblies that behave as a unit, reducing the chance that miters will open up over time.

Cap the pilasters.

By flipping the base-cap molding upside down and adding a $\frac{3}{8}$ -in. cap made from poplar, the top of each pilaster can be finished with a look that matches the plinths.



Finish with a bead.

The beads used to conceal the gap between foundation board and masonry—which are the only shop-cut molding on this project—are routed into the edge of a piece of poplar and then ripped off to create profiled strips ready for miters and pin nails.



Easy plinths.

After scribing the preassembled MDF plinths to the hearth at the bottom of each pilaster, slide them into place and tack them with a few finish nails before fastening the base molding to conceal their top edges.



To see a video about the construction and installation of this mantel, visit FineHomebuilding.com/magazine.



Master Class in Moldings

An illustrated guide to the profiles and proper proportions of baseboard, crown, and casing

BY MARIANNE CUSATO

Have you ever flipped (or scrolled) through the pages of a molding catalog and been overwhelmed by the options? If so, you are not alone. And while you may be daunted by the number of options, the fact is that typically only the smallest percentage, sometimes only a dozen or so out of hundreds of profiles, are architecturally correct. Historically, the purpose of a molding was to cover joints and transitions between materials. Over time, the functional needs evolved to become decorative and adapted to different architectural styles and periods, which has only added to the variables. Yet, with a basic understanding of the building blocks that make up molding profiles and their uses, you'll be able to navigate catalogs and lumber yards and select moldings to compose trim packages for any home. □

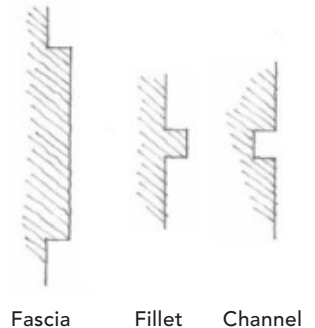
Contributing editor Marianne Cusato is the author of *Get Your House Right: Architectural Elements to Use and Avoid*. Drawings by the author.

BUILDING BLOCKS

While at a glance, moldings may appear to be a random combination of profiles—and unfortunately, in many modern applications, they are in fact no more than a mishmash of curves—even the most complex molding designs can be broken down into four simple building blocks.

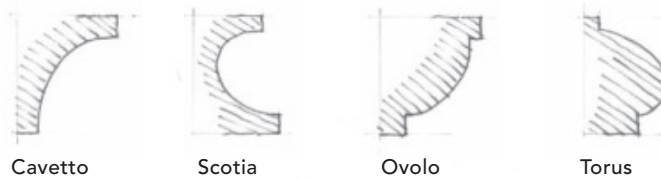
1 Flat moldings

Flat moldings can be projecting, as in the fascia and fillet, or recessed, as in the channel.



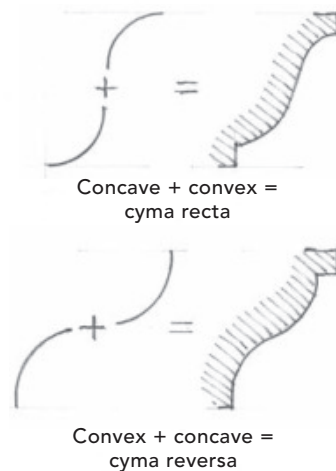
2 Curved moldings

Simple curved moldings may be concave, as in the cavetto (also known as a cove) and the scotia, or they may be convex, as in the ovolo (also known as a quarter round) and torus.



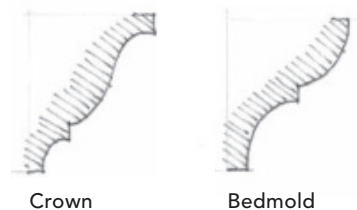
3 Compound moldings

Compound moldings are made of simple curved moldings added together in a continuous line. This is illustrated by the cyma recta and cyma reversa, in which concave and convex curves seamlessly meet to form shapes that give the appearance of a wave.



4 Combined moldings

Combined moldings are made of several simple or compound moldings added together and separated by fillets. Examples include crown molding (a cyma recta supported by a cove) and bedmold (an ovolo over a cove).



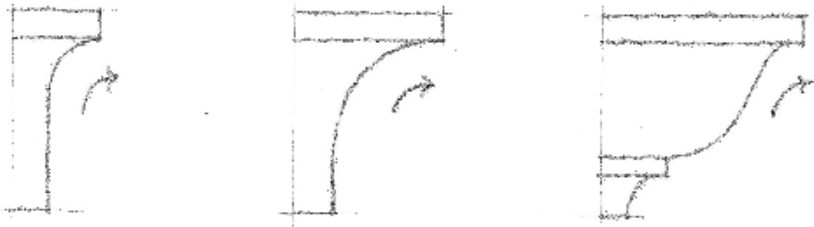
AVOID THESE COMPOUND AND COMBINED MOLDINGS

Most profiles in molding catalogs fail because they incoherently link together the simple building blocks. Examples to avoid include linking more than two simple curves together into a compound molding and combined moldings without fillets.



CATEGORIES

The building blocks generate moldings of all shapes and sizes that can be assembled in an infinite number of configurations for uses on nearly every surface of a home, both inside and out. Yet, despite the endless variables, molding profiles can be broken down into four primary categories defined by the job the molding is performing. These categories are terminating, supporting, separating, and translating.



1 Terminating moldings

The most common terminating moldings are cyma recta (crown) moldings and cove moldings. Terminating moldings are identified by an outward emphasis at the top of the profile—the top of the molding is pointing away from the wall or design element. They are only used at the top of a composition. Terminating moldings evolved from the nonstructural elements of classical temples, such as the gutter at the top of the cornice. This historical context is important, because one of the most common mistakes in the application of terminating moldings is using them in supporting positions (see “In Practice,” below).

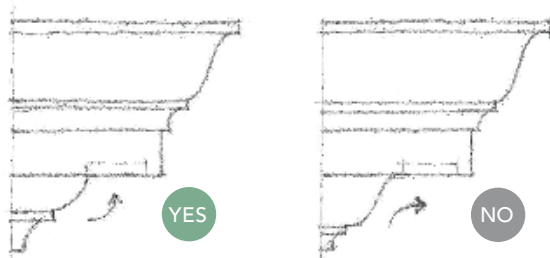


2 Supporting moldings

The most common supporting moldings are bedmolds and cyma reversa moldings. Supporting moldings also evolved from the structural elements of classical temples, specifically the plate, which transitions the ceiling joists to the roof rafters. This historical context is important to remember because bedmolds are often incorrectly replaced with cyma recta moldings within a composition of an eave or porch cornice. This mistake often happens because there may not be a bedmold profile large enough for the design.

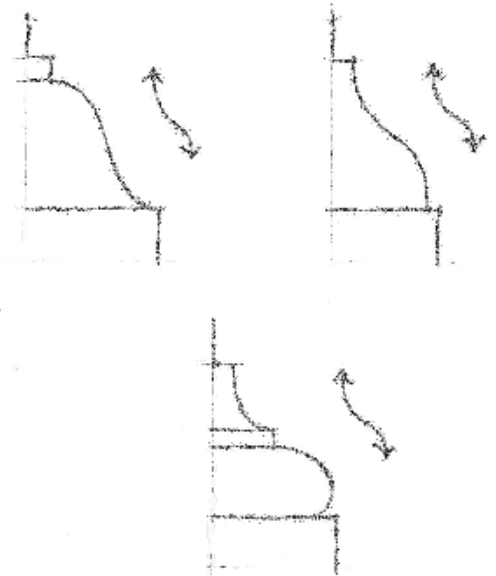
IN PRACTICE

Don't use terminating moldings in supporting positions



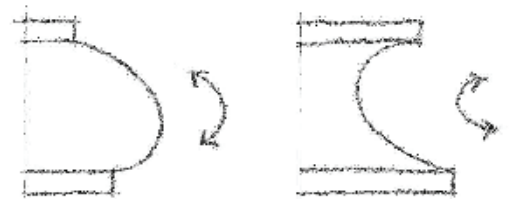
3 Translating moldings

Translating moldings transition between two planes. They operate in the opposite direction as terminating and supporting moldings. Rather than transitioning away or up from the element, translating moldings transition toward the element. In classical temples, translating moldings are most commonly found on the bases of plinth blocks under columns. Today, they are typically found in baseboard and casing.



4 Separating moldings

Separating moldings are the U-turns of molding profiles. Whether convex or concave, the top and bottom of these moldings point in the same direction. Separating moldings may be true half-circles or portions of an ellipse. They are commonly found in column bases.





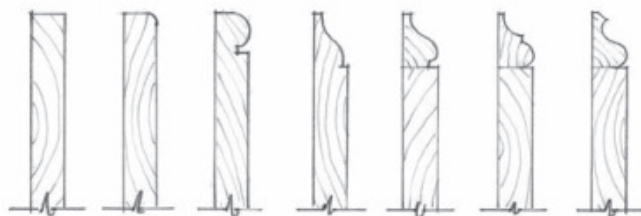
BASEBOARD

Baseboards cover the transition between the flooring and the walls. The base cap is a translating molding, or a molding that shifts between two planes—in this case, the flat top edge of the baseboard and the wall. The baseboard does not need a base cap; if stock profiles are limited or you want a more streamlined look, use a flat-stock molding throughout the house. If you are adding profiles to your flat stock, consider these rules.

Base cap options start with flat stock

A simple ogee profile keeps the clean lines of the square top but dresses up the look and minimizes surface area for dust to collect.

Nose and cove profiles are a combination of a cove molding separated from a half-round profile by a fillet. Often the profiles are elongated and elliptical.



When choosing a nose and cove, look for a clearly defined fillet and ideally a cove larger than the nose. Beaded caps may be either

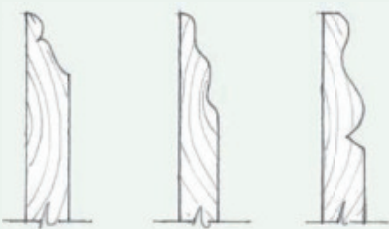
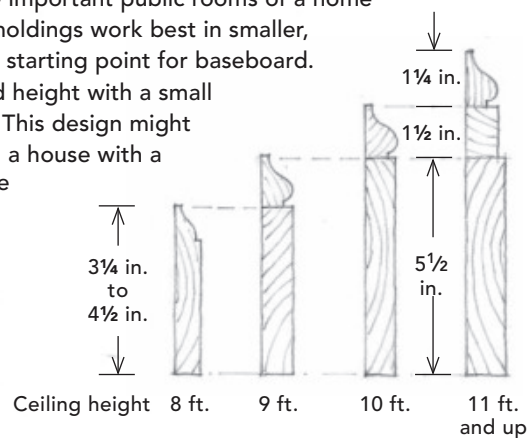
rounded or pointed with an ogee. In these designs, make sure the transitions between profiles are clearly defined.

IN PRACTICE

One size doesn't fit all

The height of the baseboard will depend on both the ceiling height and location in the home. Larger and more important public rooms of a home support larger moldings, while short moldings work best in smaller, secondary rooms. 5½ in. is a common starting point for baseboard.

If you have 11-ft. or taller ceilings, add height with a small intermediate block (1¼ in. to 1¾ in.). This design might also be reserved for the great room in a house with a 10-ft. ceiling. When you make the base shorter for other rooms in the house, set the overall height to match the flat of the taller bases, maintaining the same profiles. This helps to unify elements of different scale, tying the overall composition of a home together.



AVOID AT ALL COSTS

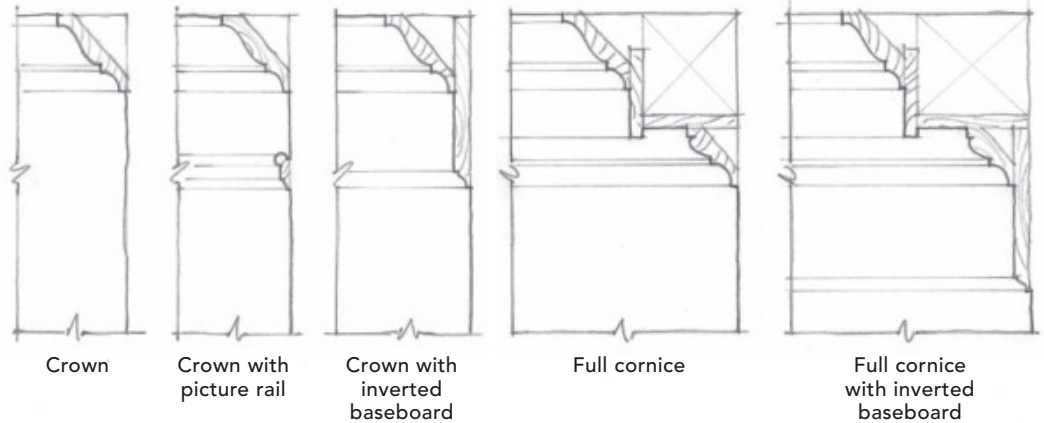
Often stock baseboard options are not available with an appropriate cap, ideally one-fifth the overall height. Try to avoid baseboards with caps over one-quarter of the overall height. Avoid bases without flats; seek defined edges. Avoid curves on curves, and avoid clamshells.

CROWN

While crown moldings are technically in a supporting position holding up the ceiling, because they are located at the top of the interior walls, they have evolved over time to be terminating moldings. Before selecting a crown molding, ask yourself if this is an element that you really need in the house. Unlike baseboard and casing, which bridge between different materials, the walls and the ceiling are typically the same material, so a connection for practical reasons is not necessary. Crown moldings are generally an aesthetic element.

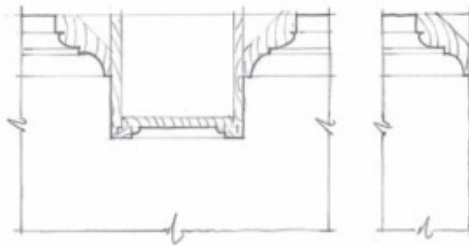
Keep crown simple

The size of the crown is not set in relation to the height of the room. The crown itself is roughly the same size regardless of ceiling height. Additional trim elements are added to make a cornice, and the cornice size relates to the ceiling height. This is an important distinction because one of the most common mistakes is to select a crown molding that overpowers the rest of the room. The simplest method for adding height to a crown is to install a picture rail about 6 in. below the crown, then paint the wall between the crown and the picture rail to match the trim color. This visually elongates the cornice. Another option is to overlap the crown onto an inverted ogee baseboard. This will extend the crown without overpowering the room.



Give beams support

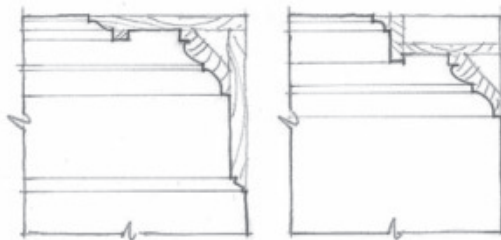
While the interior crown is typically a terminating molding, when designing a box-beam ceiling, you will want to use a supporting molding like bedmold, since a beam represents a structural element (even when purely aesthetic).



IN PRACTICE

Reduced cornices

A cornice is the top element of an entablature, which also includes a frieze and architrave. The cornice includes a cyma recta, corona, and bedmold. The crown is the top element of a cornice. Today we rarely install a full entablature, or even a full cornice, but the dimensions and proportional systems of the crowns we use find their origins in these traditional elements. An appropriate alternative is to use a reduced stylized cornice. That includes a cyma recta, corona, and bedmold, but in reduced proportions.

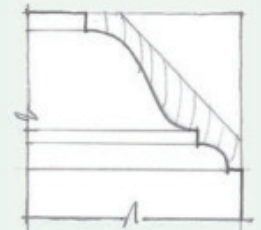


CROWN MISTAKES

To increase the impact of the crown in your room, add height and detail rather than just making it big.

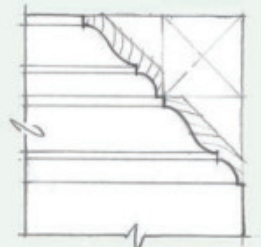
Installing giant crown

Increase the size of the trim at the ceiling by adding elements. Keep crown 4 in. high or smaller.



Doubling the crown

Even worse than a giant crown in a room is two crowns that make up a giant crown. The crown is a crowning element.



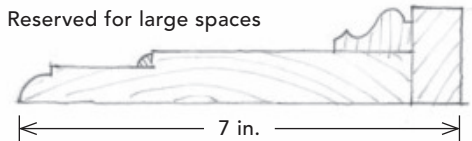
WINDOW AND DOOR CASINGS

Window and door casings follow many of the same rules of thumb as baseboard. The building blocks of casing are a flat-stock member with detail added in two areas: the backband and the transition to the jamb.

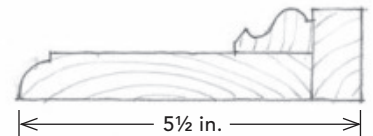
Backband and transition

A good place to start with casing is with a 3½-in. or 5½-in. flat stock. If you choose to use a backband, it should share the same profile as your base cap, and you can add transitions for style. Depending on the size of your home, you may choose to add a hierarchy between the casings in different locations throughout the house. For major rooms, you can add a step in the flat of the casing, making sure that the side closest to the backband is clearly larger than the one closest to the jamb. The alignment between casings in different parts of the home is less pronounced than between baseboards. Nonetheless, as you diminish in scale, seek opportunities to unify the designs through the individual elements and dimensions.

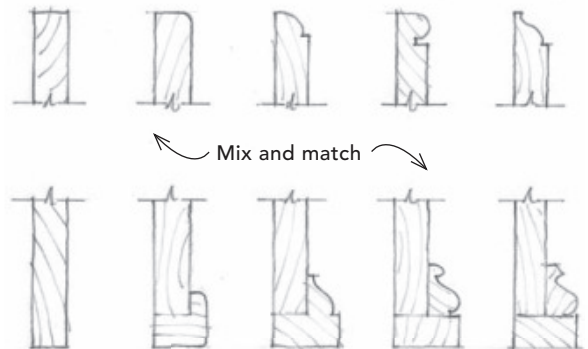
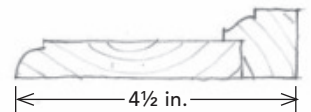
Reserved for large spaces



Typical first floor



Second floor and utility



CASINGS TO AVOID

When selecting a casing profile, look for the flat. Many stock casing profiles eliminate the flat, replacing it with a shallow ogee molding. Avoid these options. Additionally, avoid an overpowering backband. It's not typically possible to purchase a one-piece casing with a correctly proportioned backband. If you want to purchase a one-piece casing, try to find one where the backband is not more than one-quarter of the overall dimension. Avoid melted moldings—those without clearly defined profiles. Many casings are simply a mashup of curves without purpose or definition. Finally, avoid clamshells.



Missing flat



Overpowering backband



Undefined molding



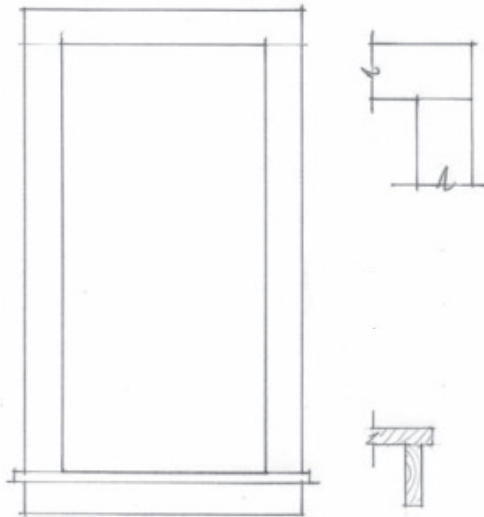
Clamshell

IN PRACTICE

Casing installations

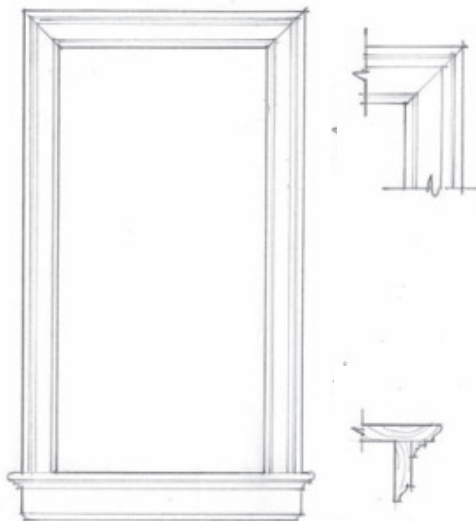
Flat-stock details

When using a flat-stock casing without a backband, install the casing with butt joints, not miters. The vertical legs support the horizontal top piece and sit on the window stool, which is then supported by an apron.



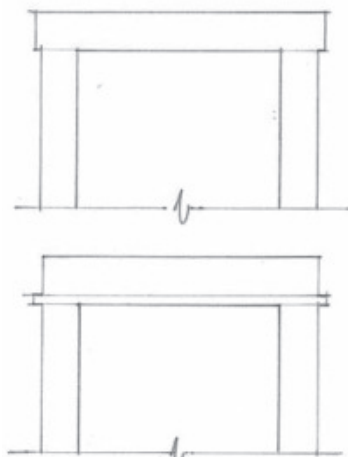
Backband details

When using a casing with a backband, miter the top corners. Don't picture-frame the bottom corners of the window casing, though; instead, have the vertical legs sit on a window stool supported by an apron.



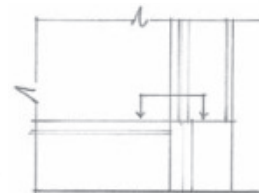
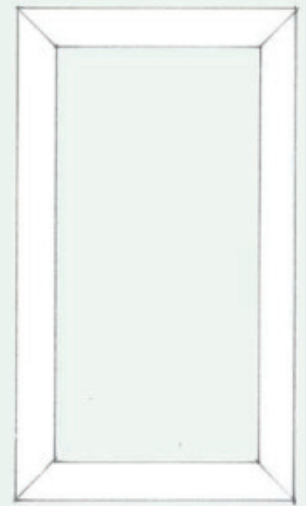
Head-casing details

Traditional casing details include adding a 1/2-in. board with a half-round edging just below the head casing. Other designs extend the top member 1/4 in. or so wider than the sides to hide imperfections or expansion and contraction. The common thread between all of these variations is the flat-stock foundation with simple additions to add detail.

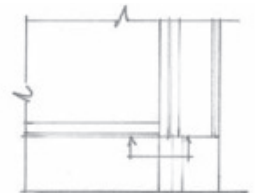


AVOID PICTURE FRAMES

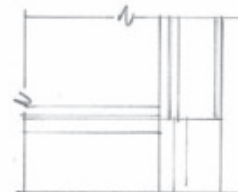
Avoid casing windows with four mitered corners and no stool. Without the stool, the window looks ungrounded in the wall.



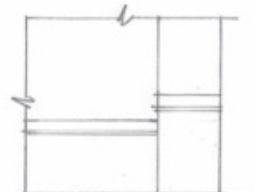
Align with top of base cap



Align with top of flat



Align with top of step in base cap



Avoid baseboard plinths

Align plinth blocks with an element of the baseboard

Plinth blocks sit at the bottom of door casing as a transition for the baseboard. They can be set to the overall height of the baseboard or to the flat of the baseboard, leaving the base cap to resolve into the backband of the casing. One good option is to angle the plinth blocks to reduce in depth as they get closer to the door opening.

Restore a Wood

When repairs are in order, a steam box, an easel, and two-part epoxy are your best friends

BY BEN BRUNICK

There's a debate among preservationists and energy nerds, traditionalist and modernist, about what to do with old single-pane, divided-lite, weighted window sashes. They have lots of character and history, but also a big energy penalty compared to replacement options.

I won't try to convince you to restore your old windows. But if you do need to repair a window sash, or a whole house worth of window sashes, I can help you get it done right and with as little frustration as possible. I learned a lot of lessons while tackling the restoration of a historic municipal building that is to become a museum for the city of Yankton, S.D., my hometown—a project for which I repaired, reglazed, and restored hundreds of wood sashes and their window frames. The work prepared me well for the job you see here, which was restoring the windows in my own 1920s bungalow.

Repairs take time

Restoring a 100-year-old window sash so it will last another 100 years means removing the old glazing putty and glass, stripping the frame back to bare wood to make any necessary repairs, priming, reinstalling the glass and

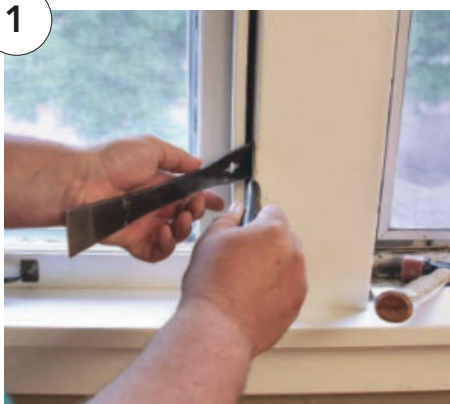


To watch a series of videos about restoring window sashes, visit FineHomebuilding.com/magazine.

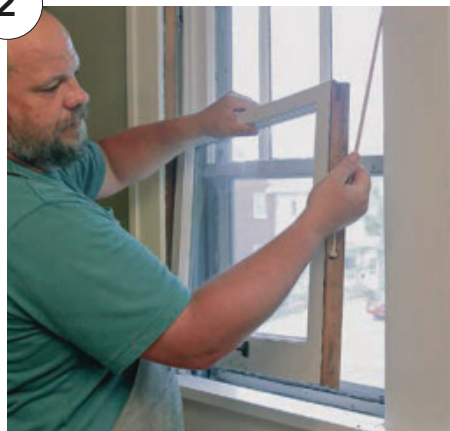
Window Sash

TAKE CARE WHEN REMOVING THE SASH

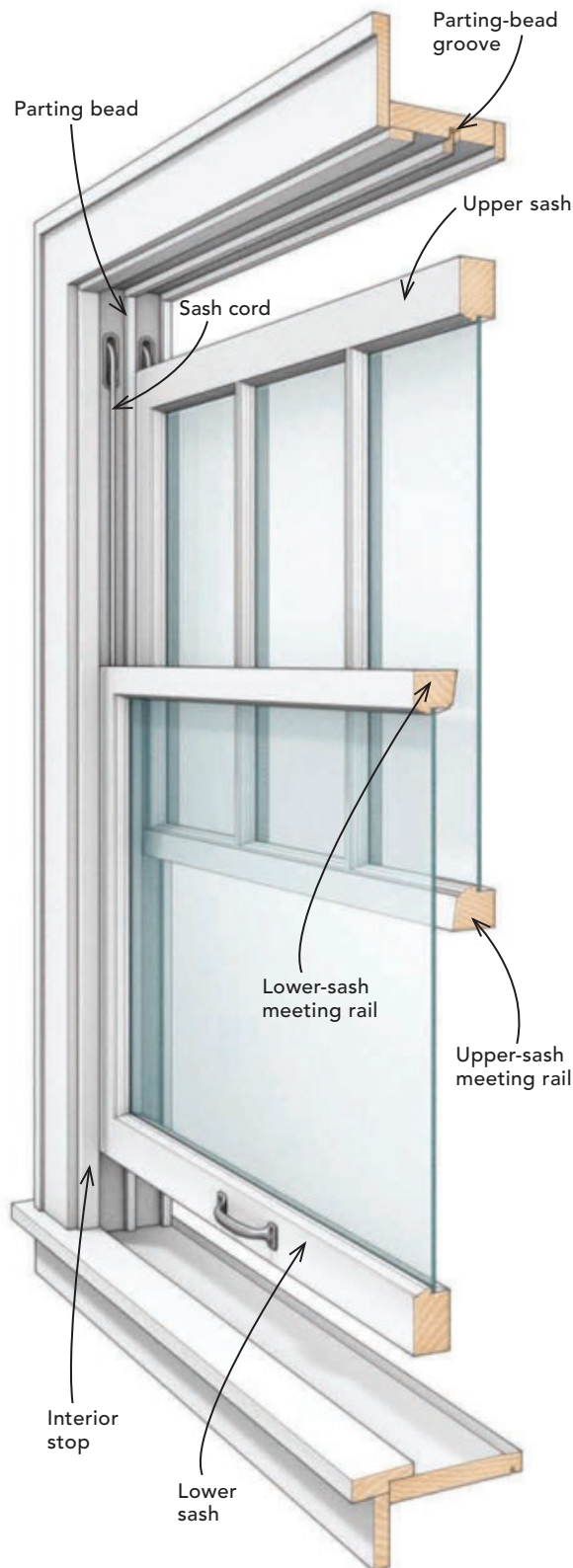
Old weighted-sash wood windows were built to be easily disassembled and repaired. Knowing how these windows were built before you start is helpful, but don't assume parts are universal or even interchangeable from one window to the next. Label all the parts so you know where they go to make it easier to reinstall the sash later.



Dent prevention. Cut any paint or caulk between the interior stop and window frame with a utility knife. Then, pry the stop free using a putty knife to protect the frame. If there is a nail near the top miter, cut it with an oscillating multitool before trying to pull out the stop.



Remove and inspect the cord. The sash cord is easy enough to remove, but it's worth inspecting its condition and, if necessary, replacing it with new sash cord (not rope, which will degrade in sunlight).



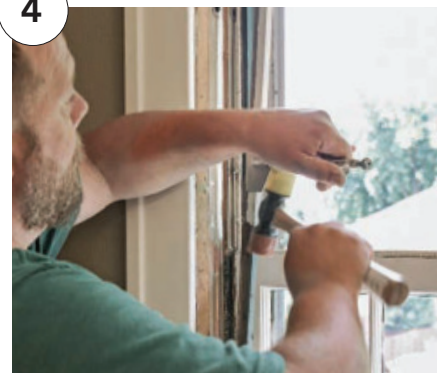
3



Upper sashes are often stuck.

Though upper sashes are meant to be mobile, they're often painted shut over the years. Use a pair of bar clamps, reversed to spread apart, to ease the sash free. Place the clamps wide, at the edges of the meeting rail. Otherwise, you may just bend and possibly damage the rail and the pinned bridle joints used to assemble these sashes.

4



The parting bead is tricky.

The shape of the upper sash's meeting rail makes it impossible to remove the parting bead by pulling it to the side. Instead, you have to lower the upper sash all the way. Then, starting at the top, use a pair of sheet-metal pliers to pull the parting bead from the groove. Once most of the parting bead is out of the groove, pull the top end inward so it clears the window frame, and then pull up, tapping the pliers with a mallet if necessary.

STEAM THE SASH TO REMOVE THE GLASS

Use a steam box to soften the old glazing putty. To avoid thermal shock, which can break the glass, either put the sash in the steam box before firing it up, or leave the door open for a few minutes before inserting the sash. Put the sash in with the outside of the window facing up so the glass doesn't fall out and break when the glazing putty softens—usually in about 45 minutes to an hour.

Be ready to go. Stand back when first opening the door and let the steam clear. Wear gloves with thermal protection (like these Therma-Fit gloves from Atlas) and quickly move the sash to a flat work surface.



Make a simple steam box

A steam box is a fairly straightforward and very helpful tool for this job. The box, based on a design by my friend Dave Bowers, creates steam by heating water in a metal gas can (that has never held gasoline!) set on a propane-fired turkey fryer. Steam enters the box through a common rubber hose and is distributed evenly inside through copper pipe drilled through with holes. The box itself is foil-faced rigid foam—seams caulked with fire-rated silicone—with a wood frame for durability. You can make the steam box the right size for your project and create shelves inside with copper pipe or electrical conduit.



Free the glass. Use a putty knife to scrape away the old glazing. Before attempting to remove the glass, make sure all the glazing points are out of the sash. If the putty knife didn't get them out, use a screwdriver or pliers to pry or pull them. Finally, lift the glass from underneath and carefully set it aside.



Clean the glass. With the glass removed, you have access to its edges and corners. So, now is a good time to clean it up. Use glass cleaner and new razor blades. Old or jagged blades can scrape the glass, so change blades often. Once clean, label the glass with a piece of tape. The panes tend to be irregular and will likely only properly fit the opening they came from.

glazing, and finally, applying a couple coats of paint. Though no one part of this process takes too long, there is a lot of downtime.

For example, I use a steam box to soften the glazing putty, which allows me to easily remove the glass without breaking it (though I've learned to expect to break about 20% of the glass on a bigger job). The steam will also soften the paint, but don't be tempted to try to scrape it off along with the glazing. The steam will not only soften the glazing and

paint, but the wood itself, making it more susceptible to damage from the scraping tools.

Even if I can manage to remove the softened paint without damaging the wood, the tools will leave the surface fuzzy and in need of a lot of sanding. Too much sanding changes the dimensions of the sash, which can result in a sloppy fit when it's reinstalled in the frame. Rather than risk damaging the wood frame or the window not working right, I wait 24 hours for the wood to dry before scraping.

The steam box isn't the only tool that makes this tedious job much more tolerable. I also use a shopmade easel to hold the sash upright while I scrape paint and apply glazing putty. One clamp holds the sash in any number of helpful orientations and the easel's shelf and hook offer a handy home for putty, chalk, scrapers, sanders, and any other tools and materials that I want to have nearby.

It takes about 24 hours for any epoxy repairs to be ready for sanding and two

SCRAPE IT BARE, THEN REPAIR



1

Let the sash dry for about 24 hours after steaming. Then scrape it down to bare wood to get it ready for repairs. In this case, the only issue was minor checking in the wood along the meeting rails. To contain paint chips and dust, set up plastic sheeting on the ground and mist the sash with water to keep dust down while scraping.

Clean it out. Use a pick or knife to remove any rot, paint, dust, or other debris from the areas to be repaired and to open up the checks to allow the epoxy to penetrate and fill the repair.

2



Penetration, not puddles. Brush on the LiquidWood epoxy liberally, but only in the area in need of repair. Wait for it to penetrate the wood. The area should look wet, but there should not be puddles.

3



Fill the damaged areas. Mix the WoodEpoxy and work it into the repairs with a wide putty knife.

4



Sand it smooth. Allow the epoxy to set for about 24 hours and then sand it smooth with an orbital sander. Run the sander over the entire sash at this point to prepare it for primer.

One easel, four scrapers, and two epoxies

The right tools help you do the job quickly and well, and the right materials make the repairs durable.

Take an hour to make an easel from framing lumber and not only will you be able to work standing comfortably upright, but you'll be able to position the sash in all different ways to get the best angles for scraping (and later for glazing).

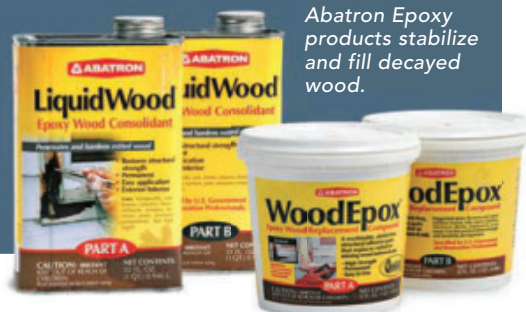
Bahco makes excellent scrapers. They're comfortable to use and the replaceable carbide blades come in many different profiles, allowing you to scrape paint from a sash's numerous shapes and profiles without damaging the wood. Finally, two epoxy products from Abatron make long-lasting repairs: LiquidWood, which is applied first and penetrates the area in need of repair, and WoodEpoxy, which adheres to the LiquidWood and fills the damaged areas. Both are two-part epoxies mixed in a 1:1 ratio.



2½-in. Bahco carbide scraper



1-in. Bahco Ergonomic carbide scraper with drop-shaped replacement blades



Abatron Epoxy products stabilize and fill decayed wood.

weeks for the glazing putty to cure enough to be painted. This means that I've had to find a way to close up the window openings for a considerable length of time. I found a pretty slick and secure method that uses a couple strips of 7/16-in. OSB fit into the parting-bead groove and a larger piece to fill the opening. A few drywall screws lock everything into place. The beauty of this method is that no screws are driven into the window frame.

Lead is likely

If you are working on a house like mine, with single-pane wood windows—or, according to the Environmental Protection Agency (EPA),

any house built before 1978—there's a good chance that the window sashes will have been finished with lead paint at some point. Following the EPA's Renovation, Repair, and Painting program (RRP) to the letter is quite involved and also necessary if you are working on a client's home. But you don't have to assume that there is lead paint present. You can test the windows, as I did.

I found that my window sashes were finished with lead paint outside, but not inside. Because I am doing the work for myself, I was not required to follow the RRP rules. Since I am tackling a few sashes at a time and can work slowly and methodically, I

REINSTALL THE GLASS

After coating the sash with oil-based primer, it's time to reinstall the glass, bedding it in glazing putty. Glazing putty is linseed oil and chalk, so it's helpful to have some extra chalk on hand to help make the putty workable and for cleanup. Any calcium-carbonate chalk, such as that used for lines on athletic fields, will work. You can find it at most hardware stores.



Prepare the putty. Knead the putty to an even consistency. Mix in as much additional chalk as necessary to make the putty feel tacky but workable without sticking to your fingers.



Bed the glass. Put a thin layer of glazing putty into the glazing rabbet before inserting the glass. Then use a palm sander—with a soft cloth wrapping the base—to vibrate the glass into place. Flip the sash over and scrape away the squeeze-out with a putty knife.



Install the points. Shoot the glazing points into the sash to secure the glass. If the points don't penetrate enough to be completely covered by the glazing, or if you don't have a glazing-point driver, tap them in by hand.

GLAZE IT, THEN LEAVE IT ALONE

It's important to tool the glazing so that it pitches away from the glass, but the amount and angle of the glazing will be determined by the size of the rabbet the glass fits into. If you go higher than the top of the rabbet, the glazing will be visible from inside the house. If you are too far below the top of the rabbet, there won't be adequate pitch.

Work in the order shown here and when finished, keep the sash in its upright position until it is reinstalled. This will keep the glass from shifting and the most important glazing—at the bottom of the window—from being disturbed. Allow the glazing to set for about two weeks before painting, and wax the sides of the sash before reinstalling.

1

Upside down.
First, glaze the top of each pane.



2

Sideways.
Next, glaze both sides of each pane.



3

Right-side up.
Finally, glaze the bottom of each pane.



4

Clean the glass again.
Brush the glass with chalk to remove any oil residue from the glazing putty.



took some precautions, but not enough to satisfy the EPA. For example, I did not set up a perimeter around the area when I was removing the window sashes. I did close off the door to the room and took care to vacuum with a shop-vac fitted with a HEPA filter as soon as the sashes were out. And I set up a wide perimeter of plastic sheeting under my easel while scraping. I wore a Tyvek suit, which never left the work area, as well as gloves and a respirator, and I used a spray

bottle to mist the sashes as I scraped. I'm not suggesting that this is best practice. It was an amount of protection that I felt comfortable with at my own home. If I had been working at a client's house, I would have followed the RRP rules.

While most of the products that I use to do this work are not harmful, I do recommend painting the sashes with an oil-based primer before glazing. This step should be done safely—either outside or in an area

with excellent ventilation, while wearing a proper respirator.

Not all old wood windows are in good enough shape to be restored. Sometimes replacement is the best option. But, if you decide yours are worth saving, it's a job you should only do if you're going to do it right. □

Ben Brunick runs Chalkstone Woodworking in Yankton, S.D. Photos by Brian Pontolilo, except where noted.

INSTALLING A

Wall-Hung Toilet

These fixtures save space and make your bathroom easier to clean, but installation demands a different workflow

BY ANDREW GRACE

A couple who are regular clients have a 10-year-old son with cerebral palsy, and he needs a wheelchair to get around. They recently bought a '60s-era ranch so all of their living space would be on one level. Among the projects on their remodeling wish list was a more spacious bathroom with enough room for their son to maneuver his wheelchair. So, in addition to a roll-in shower unit, we also installed a wall-hung toilet.

Instead of an exposed tank that sits behind the bowl, wall-hung toilets have a tank in the wall, saving about 2 sq. ft. of space. This might not sound like a lot, but it is when you have a small bathroom or when you're in a wheelchair. Another advantage of wall-hung toilets is that they're height-adjustable, allowing you to match the bowl height to the user's preference. This is especially valuable to folks with mobility issues; having the bowl the same height as a wheelchair makes it easier to transition from the chair to the toilet and back.

But you don't have to be in a wheelchair to see the perks of wall-hung toilets. They also look great and the uninterrupted floor below the bowl is easier to keep clean. Here I'm installing a Toto model (about \$1000), but similar models are available from Kohler (shown near right), Geberit, and others, and the installation process is virtually the same across brands. □

Andrew Grace is a remodeler in Ligonier, Pa. Photos by Patrick McCombe, except where noted.



THREE-STEP PREP

The steel frame, called the *carrier*, is nearly ready for installation right out of the box, but first you have to frame the opening, adjust the height, and install the supply-line adapter.

Frame the opening. Because the tank and waste line of a wall-hung toilet are set into the wall, installation demands a 2x6 cavity with a roughly 2-ft.-wide by 4-ft.-tall opening.

Adjust the carrier height. One significant advantage of a wall-hung toilet is that you can adjust the bowl height from 15 in. to 19 in. About 15 in. above floor level is standard height for a toilet, but telescopic legs allow this height to be adjusted prior to installation. If they are not already installed, be sure to consider the thickness of the finished flooring and its underlayment when setting the height.

Install the supply-line adapter. Carriers are available for both copper and PEX rough-ins, and are easiest to prep prior to fastening in the wall. The connection for the supply line is on the left side of the tank like a conventional toilet. (The fitting also accommodates an optional bidet seat.)



ROUGHED IN AND READY

The carrier supports the bowl and houses the tank and flush mechanism. Once it's fastened to the framing, the supply and waste lines are brought in from below.



Fasten the carrier. The carrier, which is rated to support 880 lb., is secured to the framing with eight lag screws driven into predrilled holes. Six screws go through the sides of the frame and two fasten the legs to the bottom plate.

Prepare the waste line. The kit includes a 3-in. elbow that fits within a 2x6 wall. A flexible coupling attaches the elbow to the waste line running below the floor. The elbow is snapped into place and held in position on the carrier with a U-shaped plastic clip.



Connect the supply line. After fastening the carrier, connect the supply line. Because the connection will be hidden behind the drywall, the shutoff valve is remotely located behind the panel that houses the flush buttons.

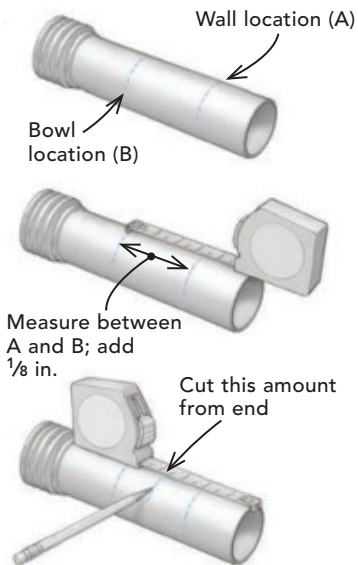
CAREFUL CONNECTIONS

After installing the drywall, you're ready to prep and set the bowl. Water from the tank enters the bowl through a 1½-in.-dia. inlet line and exits through a 3-in.-dia. outlet line below. Both

pipes fit with a gasketed connection, and must be precisely cut to length so they're fully seated. If the wall behind the toilet is to be tiled, the tile must be in place before this step.



Fit the inlet and outlet pipes. Both the inlet and outlet pipes are measured in the same way. First, lubricate the pipe with soapy water and fully insert it into the carrier. Mark the wall location onto the pipe using a sharp pencil and a straightedge. Remove the pipe from the carrier and fully insert it into the opening at the back of the bowl, then mark how far it enters the bowl. Measure between the marks and add ⅛ in. Cut this amount from the end.



Insert the inlet and outlet.

Lubricate the inlet and outlet pipes again and then fully insert them into the connections on the carrier.



Chamfer the ends. After cutting the parts to length, use a knife to remove any burrs and then chamfer the cut edges with a file. This important step prevents damage to the O-rings that seal the pipe connections as the parts come together.

INSTALL THE BOWL AND FLUSH BUTTONS

With the inlet and outlet connections in place and their gasketed ends lubricated with soapy water, the bowl is ready to be attached to the carrier and it's time for the final touches. The last part of the installation is to fit and adjust the flush buttons.



Adjust the mounting studs. The threaded mounting studs can be adjusted with a screwdriver to accommodate different drywall and tile thicknesses. Set the studs so they protrude 2 in. from the finished wall surface.

Slide on the bowl. Install the sound-deadening gasket that goes between the bowl and the wall and slide the bowl over the threaded studs and into its final position. Do this carefully so you don't damage the gasketed ends of the inlet and outlet connections.



Set the depth. Adjust the clear-plastic access panel behind the flush buttons so it's inset $\frac{1}{2}$ in. from the finished wall surface. Removing the clear panel provides access to the shutoff and all of the tank's internal parts so they can be serviced or replaced.

Adjust for wall thickness. The plastic housing that holds the flush buttons is screwed to the previously adjusted clear-plastic panel and then the plastic rods that actuate the flush valve are adjusted with a screwdriver to match the wall thickness.



A Better Wall for Production Builders

Meet NAHB's new wall assembly,
with a 77% better R-value than a standard 2x4 wall

BY MATTHEW MILLHAM

Designing a better wall system isn't particularly hard. Designing one with a chance of being accepted by production builders, on the other hand, has proven difficult—and that's a problem.

Demand for higher-performance wall systems is growing, partly because of more-stringent energy codes. But builders aren't adopting existing solutions—things like double-wall framing or thick layers of exterior rigid foam over wall sheathing—in significant numbers.

The National Association of Home Builders' (NAHB) Home Innovation Research Labs is trying to lure more builders into constructing high-efficiency walls with the development of its "Extended Plate and Beam" wall system.

Called EP&B for short, Extended Plate and Beam adapts methods that production builders—who build the majority of American homes—already know. At its most basic, EP&B consists of 2x4 studs between 2x6 top and bottom plates, and the extra 2-in. overhang is filled with rigid foam before structural sheathing is attached with

long nails (see drawing right). From there, installing windows, doors, flashing, and cladding is largely the same as for a regular 2x6 wall.

The main advantage to production builders? Installing OSB or plywood outboard of the rigid foam removes the need for furring strips.

EP&B vs. other walls

According to calculations made by the Home Innovation Research Labs, the EP&B system costs less to build than either a 2x6 wall with continuous exterior rigid foam or a double-stud wall.

In its most basic configuration, an EP&B wall with 2 in. of extruded polystyrene (XPS) foam and R-13 fiberglass batts has a nominal R-value of R-23. That's a 77% increase in R-value from a conventionally framed 2x4 wall with the same R-13 batt insulation and no foam.

Analysis published by the United States Department of Energy (DOE) estimates the cost of this particular wall assembly at \$21.12 per sq. ft. of framing when sided with fiber cement—\$2.18 more than a regular 2x4 wall, including materials and labor. In other words, for

COST COMPARISON

The EP&B wall's developers tested and compared the nominal R-value and cost per sq. ft. to construct various wall assemblies. Costs per sq. ft. and nominal R-values for walls clad in fiber-cement siding are shown here. By their analysis, their assembly costs more than standard 2x6 walls, but \$0.55 per sq. ft. less than the International Energy Conservation Code's (IECC) prescriptive 2x4 wall with 2 in. of exterior rigid foam.



EXTENDED PLATE AND BEAM WALL

Designed to appeal to production builders, Extended Plate and Beam walls include a layer of rigid-foam insulation between the structural sheathing and the studs. At its most basic, the walls consist of 2x4 studs between 2x6 top and bottom plates. The plates are flush with the studs on the interior, but 2 in. proud of the studs on the exterior. This 2-in. overhang is filled with 2 in. of rigid-foam insulation, and the entire wall is skinned over with structural sheathing fastened with long nails.

2-in. XPS rigid-foam insulation (XPS, faced EPS, and polyiso rigid foams are acceptable. If only one side is faced, facing must be installed toward the cavity.)

Windows framed with 2x4 framing

To provide shear resistance, structural sheathing is attached directly to extended plates, and continuous between top and bottom plates. Vertical seams must be staggered and break on studs.

Double rim can act as a header for the openings below (joist hangers required) and can be inset 1 in. to accommodate rigid-foam insulation.

Cavity insulation

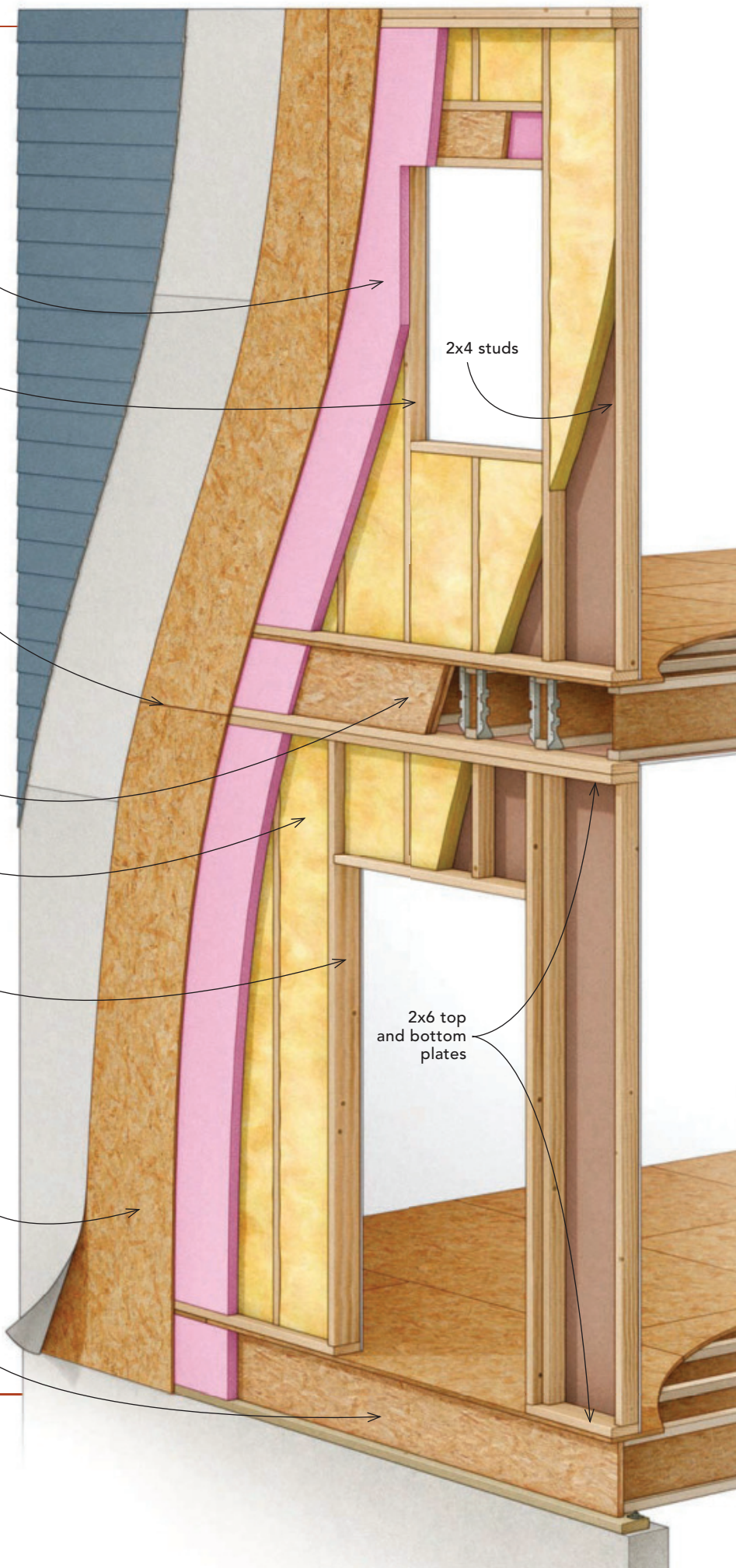
Doors framed with 2x4s (typical) or 2x6s (sliders or heavy-duty)

$\frac{7}{16}$ -in.-thick (minimum) structural sheathing (OSB or plywood), oriented vertically and attached with $3\frac{1}{2}$ -in. by 0.131-in. nails 3 in. o.c. around the perimeter and 6 in. o.c. in the field.

Rim at foundation can be inset 2 in. to accommodate rigid foam, but sheathing must be installed continuously from top plate to sill plate and fastened to the sill plate per the nailing schedule.

2x4 studs

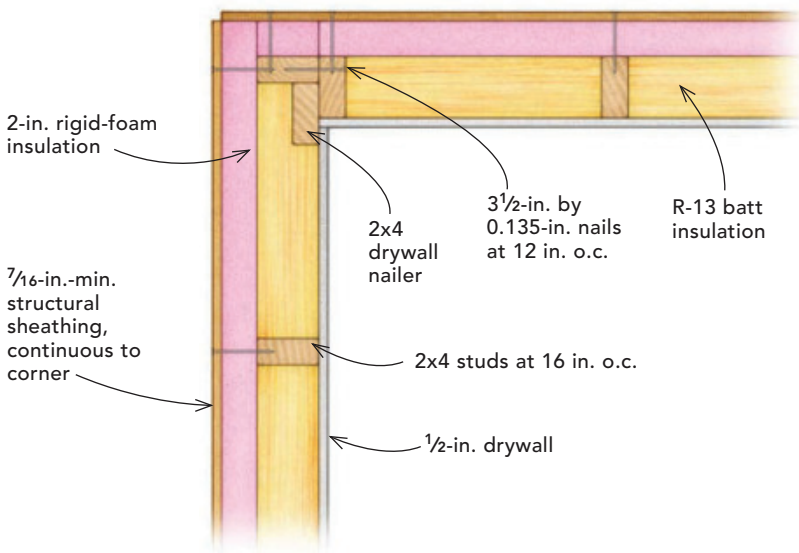
2x6 top and bottom plates



CORNER DETAILS

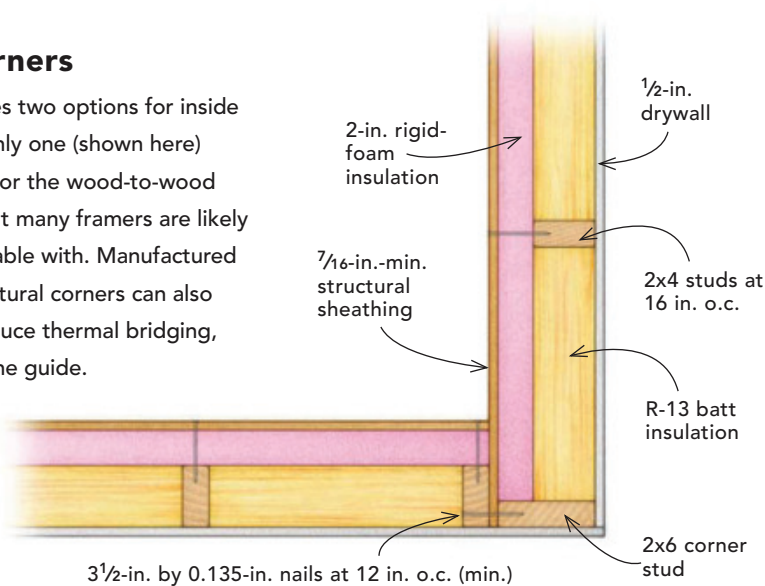
Outside corners

The Home Innovation Research Labs developed a guide to the Extended Plate and Beam wall system that details a handful of ways to connect inside and outside corners. For outside corners, there's only one option (shown here) that allows for rigid foam to wrap around the entire corner. Other options result in additional thermal bridging, or a significantly reduced R-value at the corners. Manufactured insulated structural corners can also be used to reduce thermal bridging, according to the guide.



Inside corners

The guide gives two options for inside corners, but only one (shown here) that provides for the wood-to-wood connection that many framers are likely to be comfortable with. Manufactured insulated structural corners can also be used to reduce thermal bridging, according to the guide.



For more information about Extended Plate and Beam walls, including a builder's guide and analysis of the concept, check out the Home Innovation Research Labs' website, homeinnovation.com. Visit GreenBuildingAdvisor.com for editor Martin Holladay's take on the EP&B system, covered in his weekly "Musings of an Energy Nerd" blog.

an 11.5% premium, they saw a 77% bump in nominal R-value.

Builders can also build an EP&B wall with 2x6 studs and 2x8 plates. But because a 2x8 is only 7 1/4 in. wide, the remaining overhang leaves room for only 1 3/4 in. of rigid foam, producing a nominal R-29 wall with XPS and fiberglass batts. (Builders can rip 2x10s down to 7 1/2 in. to get a full 2 in. of foam and an R-30 wall.) By comparison, a standard 2x6 wall with fiberglass batts has a nominal R-value of R-20, according to DOE analysis.

While the system reduces thermal bridging at the studs, the rigid foam doesn't cover the plates (or, in its most basic configuration, the rim joists), resulting in more thermal bridging—and in most cases more air leakage—than systems with continuous insulation.

The devil is in the framing and fastening details

The Home Innovation Research Labs produced a manual, titled "A Builder's Guide: Extended Plate & Beam Wall System," which gives options for various framing details.

The manual notes that EP&B walls need 3 1/2-in. nails every 3 in. on the edges of sheathing panels and every 6 in. along studs for adequate bracing. While this approach works in most of the country, it is not suitable for high-seismic or high-wind areas.

The "Beam" in Extended Plate and Beam refers to the rim joists, which can be doubled up so that structural headers over openings aren't necessary. Thermal bridging can be further reduced—by more than 95% overall, according to developers—if the rim is inset to accommodate rigid-foam insulation. Doing this can, however, add complexity.

Siding weighing less than 3 lb. per sq. in. can be fastened to the sheathing with standard nails, though heavier siding requires fasteners that extend to the studs.

Awaiting code approval

This system is not yet recognized by the International Residential Code, though its developers are hoping to get approval at upcoming code hearings.

Until codes change, local code officials may give this approach a thumbs-down unless a builder submits engineering documents validating the system's soundness. □

Matthew Millham is an associate editor. Contributions by Martin Holladay, editor of GreenBuildingAdvisor.com.

Flawless Wiped Finish

For great results with wipe-on polyurethane, you have to go beyond the instructions on the back of the can

BY RODNEY DIAZ

The stairwell in our new home, a 1940s cape, turned out to be a little too tight for our 1990s bedroom furniture. As a result, our 14-drawer chest and a tall wardrobe were relegated to the basement for storage. Rather than shopping for smaller furniture, my wife and I agreed that this was my chance to design and build the Shaker-style built-in I've dreamt of for years.

In keeping with the Shaker aesthetic, I chose cherry for the face frame, doors, and drawer fronts. I wanted a durable, low-luster clear finish that would be easy to apply without having to worry about brush strokes or overspray and would bring the cherry's grain pattern to life.

Over the past thirty years, I've built lots of cabinets and furniture and applied almost as many different finishes. Paint, shellac, varnish, urethane. You name it, I've probably tried it—brushed, wiped, or sprayed. And while each project turned out OK, I was never satisfied with my results until developing this method for applying polyurethane. The secret is in the sanding. □

Rodney Diaz is *Fine Homebuilding's* deputy art director.
Photos by Matthew Millham, except where noted.



FLATTEN FIRST

Sanding will get you smooth, but planing will get you flat—and a flat surface is the best place to start sanding.

The first step to a great finish is to remove mill marks and low spots left by machines. The fastest way to do this is with a high-quality jack plane fitted with a razor-sharp blade. Pencil marks across the surface will reveal low spots as high spots are removed. Take as many light passes as needed to get the surface flat; the wood shavings should be paper thin and soft to the touch. If there's any tearout, try a lighter cut, change the direction you're planing, or brush up on handplane dos and don'ts. (For our favorite advice on sharpening and using a handplane, visit FineHomebuilding.com/Magazine).



SAND SECOND

Most instructions for applying wipe-on poly call for sanding to 220 grit. Start there, but don't stop until you get to 1500 grit.



POWER-SANDING

With the surface planed flat, a random-orbit sander outfitted with 220-grit sandpaper will make quick work of smoothing most parts of the wood. This is also a good way to level surfaces where two boards meet, such as glued-up panels or cross-grain joints in face frames and doors. Narrow and profiled surfaces should be done by hand.

Random-orbit sanding discs are available in very fine grits, but for everything above 220 grit I prefer to hand-sand. My sequence is 320, 400, 500, 800, and finally 1500. Sandpaper wrapped around a cork block works fine, but sanding sponges are even nicer for the ultrafine grits; they seem to glide over the surface.



HAND-SANDING

Hand-sanding may sound daunting, but because the wood is already dead flat, you can actually move through the grits very quickly. Sand in the direction of the grain, and work through each grit until you have removed the marks left by the previous grit. By the time you have sanded to 1500 grit, the surface should feel almost glass-smooth.

FINISH LAST

From dull to low-luster to satin, the sheen of the finished surface is controlled by the number of coats.

After vacuuming off the dust, it's time to wipe on the poly. A wadded-up T-shirt rag is the perfect applicator. Decant the finish into a plastic bottle with a flip-top cap, then use it to charge the pad with a small amount at a time. Don't soak the pad, just wet the bottom of it.



To see a video demonstrating this finishing process, visit FineHomebuilding.com/magazine.



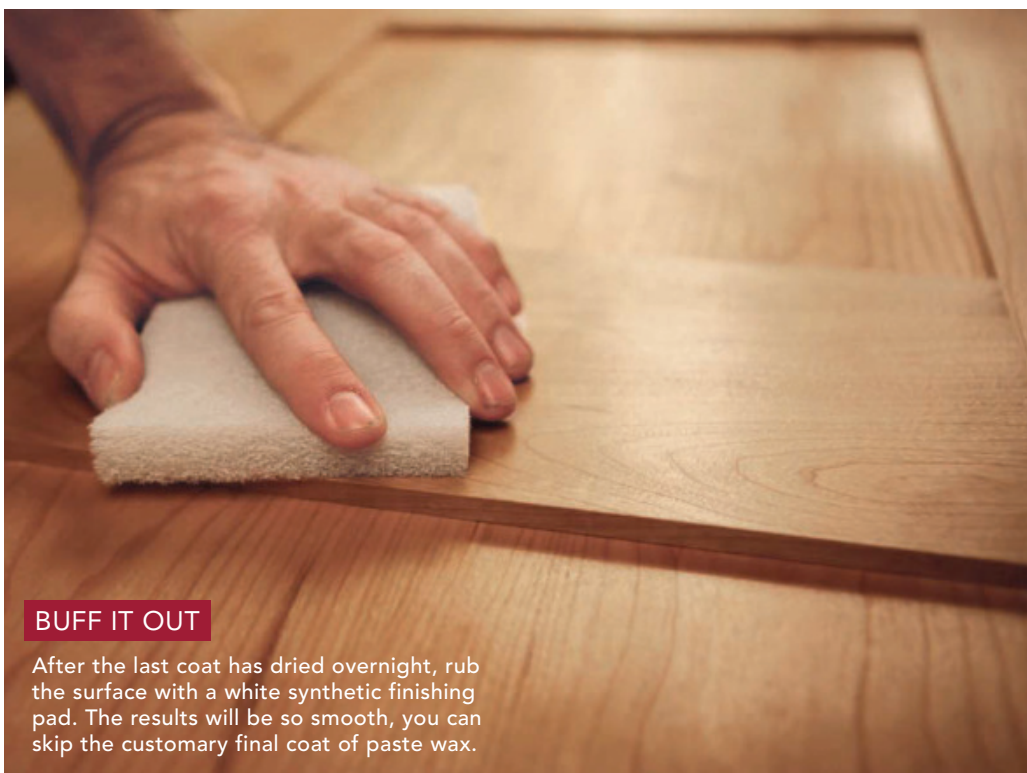
WIPE IT ON

With a gentle swiping motion following the grain, wipe the finish across the surface without pushing it over the edges. Keep wiping until the entire surface has thoroughly absorbed the finish. The first coat will be dry to the touch in just a few minutes, but a two-hour wait between coats is a good rule of thumb to follow.



BUILD IT UP

Because the surface has been sanded to such a high level, there's no need to sand between coats. After a couple of coats of satin poly, the surface should look and feel like a flat, oil-rubbed finish. For the backside of doors and drawer fronts, stop here. For more protection and a true satin sheen, add at least two more coats.



BUFF IT OUT

After the last coat has dried overnight, rub the surface with a white synthetic finishing pad. The results will be so smooth, you can skip the customary final coat of paste wax.



The oil-based version of Minwax's Wipe-On Poly imparts a slight amber tint to the wood, which is great for cherry. The water-based version dries clear, which is better suited for light-colored woods like maple. Both 3M and Norton make a white synthetic finishing pad equivalent to 0000 steel wool, but without the dust or the rust.

Get the Right RIGID FOAM

BY MICHAEL MAINES

POLYISO

POLYISOCYANURATE

\$0.42 to \$0.96 per bd. ft.

Polyisocyanurate, a urethane-based product closely related to spray polyurethane foam, is available in a couple of varieties. Polyiso is always formed between facings of some sort, usually aluminum foil, fiberglass, or fiberboard. It has an R-value of 5.6 per in. at 75° and a compressive strength of 25 psi. The primary blowing agent for all polyisocyanurate foam, pentane—with a global warming potential (GWP) of 5—is benign compared to the hydrofluorocarbons (HFCs) used in the manufacturing of XPS. Unfortunately, the foam will absorb moisture if unprotected and its R-value drops by about half a point per inch in temperatures below 25°.

EPS

EXPANDED POLYSTYRENE

\$0.44 to \$0.79 per bd. ft.

Tiny beads of polystyrene are heated, expanded with a blowing agent, and then molded with steam to form blocks. EPS is most often white in color, and you can see the expanded beads packed together in the finished product. It is produced in a range of types, with R-values from R-3.1 to R-5.0. Lightweight type I EPS (10 psi), which is fine for roofs and foundation walls, is what you're most likely to find at the home center, but type II (15 psi), and type IX (25 psi) are available for residential slabs and foundation footings. In fact, EPS rated up to 60 psi is available for high-load applications.

XPS

EXTRUDED POLYSTYRENE

\$0.43 to \$0.83 per bd. ft.

Formed by injecting a blowing agent as the melted polystyrene beads are extruded through a die, XPS can be virtually any color, but green, blue, and pink are the readily available versions. XPS is generally rated at R-5 per in. and is available in densities from 15 psi to 100 psi, but type X (15 psi) and type IV (25 psi) are the most common. At the same density, XPS is stronger than EPS, but its manufacturing process is the most damaging to the environment. The most common blowing agent, HFC-134a, has a GWP 1000 to 1500 times more damaging than CO₂. The switch over to less damaging blowing agents with a GWP of 7, called hydrofluoroolefins (HFOs), has been slow in the U.S.

Foam-board insulation can boost R-value, slow thermal bridging, and control condensation—but you better choose the right type

Suitable for insulating foundations, walls, and roofs of all types, rigid foam is one of the most versatile types of insulation. It has a high R-value. It blocks airflow and is good at controlling moisture movement. Unfortunately, it's often flammable and releases toxic fumes when it burns. The sheets can be clunky and fragile, and most foam has a much greater environmental impact than fluffy types of insulation. And

even though rigid foam can be used in nearly any part of your home's thermal boundary, not all types are suitable for all applications. If you choose to use rigid foam, there is a lot to know. Here are the basics to help you make the right choice. □

Contributing editor Michael Maines is a designer in Palermo, Maine.



FOUNDATIONS AND SLABS

Because EPS and XPS are available with good compressive strength and won't degrade in water, they are the two preferred foams for insulating the exterior of foundation walls and under concrete slabs. But when EPS or XPS are used on the inside of foundation walls, they must be covered with a thermal barrier (generally drywall) to protect them in the event of a fire. Because it can absorb water, polyiso is not suitable for contact with soil, but it can be appropriate for the inside of crawlspaces and foundation walls, and many code officials will allow some types of foil-faced polyiso in non-living spaces without requiring a thermal barrier as described in section R316.5.4 of the IRC.



WALLS

Recent versions of the IRC encourage the use of rigid-foam insulation on the exterior to minimize thermal bridging through the framing and to reduce the chances of condensation within wall cavities. Builders in colder climate zones who take this approach can use rigid foam over 2x4 studs and R-13 cavity insulation instead of 2x6 studs and R-20 cavity insulation. A layer of foam on walls in warmer climates can reduce cooling loads. In all climates, a conscientiously installed layer of taped exterior foam can also significantly reduce air leakage.



ROOFS

Rigid foam in roof assemblies allows you to get a lot of R-value in a relatively thin layer, usually only a few inches thick—a problem-solver for remodelers looking to meet current energy codes in existing buildings. Builders and designers sometimes call for a rigid-insulation layer on top of the roof sheathing, which minimizes thermal bridging and, in the proper thickness, reduces the potential for condensation on the underside of the roof sheathing. This type of assembly also brings any attic ductwork into the building envelope, improving heating and cooling efficiency.

KNOW YOUR FOAM



HEALTH CONCERNS

XPS and EPS foam both contain brominated flame retardants in order to meet code-mandated fire-resistance ratings. Brominated flame retardants are considered persistent, bioaccumulative, and toxic to both humans and the environment, and are present in XPS and EPS at 0.5% and 2% by weight, respectively. Polyiso is more fire retardant than EPS and XPS by nature, but still includes a flame retardant. The flame retardants in polyiso are also bioaccumulative, but their health effects are unknown. The blowing agents for all three types of foam are released as the materials age. How fast the gasses are released depends on the material, its facing, and the thickness of the foam. The health effects from exposure to the blowing agents from installed foam insulation is hard to predict and depends on the amount of foam, the type, and the applied facings. Workers cutting foam should have eye and respiratory protection and wear cut-resistant gloves when working with foil-faced foams.



FIRE RESISTANCE

Rigid-foam insulation is made from petroleum products that are flammable and the gasses released when it burns are toxic. So the IRC requires at least a 15-minute thermal barrier, typically 1/2-in. drywall, over foam insulation. In attics and crawlspaces that are accessed only for repairs or maintenance, foam can be covered with a different material, such as 1/4-in. wood structural panels, 3/8-in. gypsum board, or a painted-on intumescent coating. One polyiso product, Dow Thermax, has a Class I fire rating, allowing it to be left exposed in crawlspaces that are only accessed for maintenance and repairs.



THERMAL PERFORMANCE

There are four things to consider:

1. All rigid foams grow and shrink with age and temperature changes—up to 2%—so instead of one thick layer, it's best to use multiple layers with vertical and horizontal seams offset and taped. This prevents air leakage when the foam shrinks.
2. While the R-value of EPS remains constant over time, the R-value of XPS drops to R-4.1 or R-4.2 per in. over time as the blowing agents are slowly released from the foam and replaced with air. Some researchers think this happens over 40 to 50 years. Others say it happens more quickly.
3. When the temperature drops outside, the effective R-value of insulation changes—with EPS and XPS it increases, but with polyiso it decreases. Polyiso manufacturers now account for this in a long-term thermal rating (LTTR), which is usually between R-5.6 to R-6.0 per in.
4. Foam insulation in roof and wall assemblies needs to be thick enough in proportion to the amount of cavity insulation to prevent moisture accumulation on the sheathing. The minimum thickness for roofs can be found in the 2012 and 2015 IRC, table 806.5. The minimum thickness for wall insulation can be found in table N1102.1.1.2.



WATER ABSORPTION

High-density (type II) EPS readily absorbs up to 3% of its volume in liquid water. Low-density (type I) EPS will take on 4%. Even though the polystyrene beads are closed to water, there are small spaces around them where water can accumulate, reducing the R-value by 10% to 20% when the foam is saturated. Because of the hit in R-value, best practice is to keep EPS foam dry. XPS can be considered impervious to water, taking on no more than 0.3% by volume. Polyiso can absorb up to 1% of its volume. Most manufacturers say to avoid using polyiso when it will be in contact with damp surfaces, but it is appropriate for foundation-wall interiors as long as it's kept at least 1 in. or 2 in. above the slab.



All three types of foam are available in a range of thicknesses, typically in 2-ft. by 8-ft. or 4-ft. by 8-ft. panels.



VAPOR PERMEABILITY

How much water vapor can pass through a rigid insulation is expressed as its "perm rating," and depends on the material, its thickness, and the facing (if any) used on its exterior. EPS at 1 in. starts at 5.0 perms, but the perm rating drops to 2.0 perms or less at higher densities or increased thicknesses. At common thicknesses, unfaced EPS is considered a semipermeable, Class II vapor retarder, but plastic or foil facings can reduce the vapor transmission of EPS considerably. XPS is also somewhat vapor-open (1.1 to 2.0 perms) in thicknesses less than 1 in., and increasingly vapor-closed at 1 in. or more. With its usual foil or fiberglass facings, polyiso is a Class I vapor retarder—it essentially blocks all water-vapor movement.

Perm ratings for a 1-in.-thick insulation layer

Insulation	Compressive Strength	Permeance
EPS	10 psi	5.0 perms
EPS	15 psi	3.5 perms
EPS	25 psi	2.0 perms
XPS	15 psi	1.1 perms
XPS	25 psi	1.1 perms
Polyiso (fiberglass)	25 psi	1.0 perms
Polyiso (foil faced)	25 psi	.03 perms

Class I vapor retarder

Vapor semi-impermeable (1.0 perms or less and greater than 0.1 perms)

Class II vapor retarder

Vapor semipermeable (10 perms or less and greater than 1.0 perms)

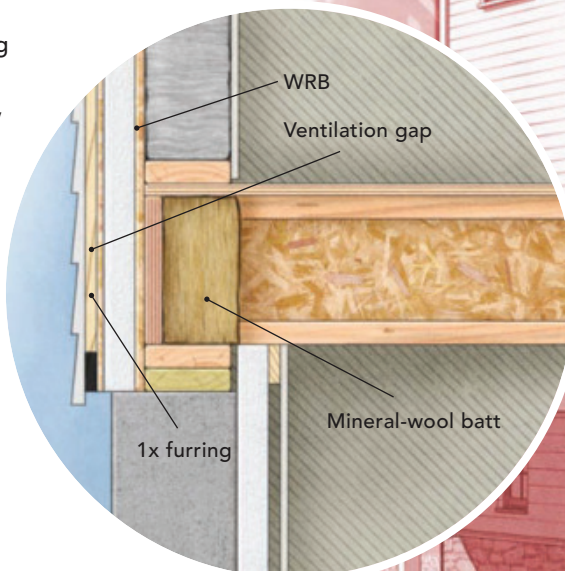
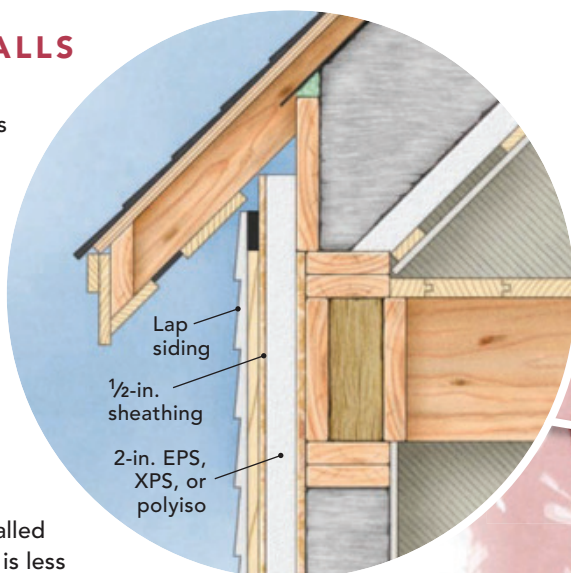
Class III vapor retarder

Vapor permeable (greater than 10 perms)

PUT RIGID FOAM TO WORK

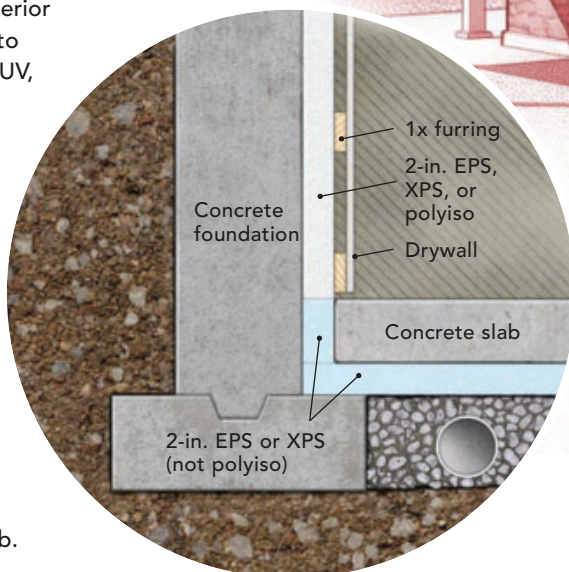
EXTERIOR WALLS

It's best to place the foam layer on the wall's exterior, which keeps framing lumber and sheathing warm and dry, though some sidings like brick, synthetic stucco, and vinyl can be installed directly over exterior foam. Lap sidings require vertical nailers at least $\frac{3}{4}$ in. thick for siding attachment. Foam installed on the interior of walls is less desirable because it keeps the framing and sheathing colder, making it harder for these materials to dry. Interior foam can complicate drywall, trim, and cabinet installation, because these items must be fastened through the foam layer and into the underlying framing.



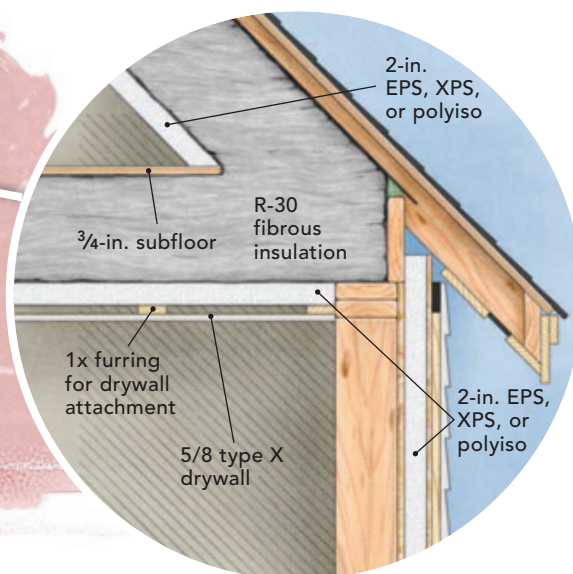
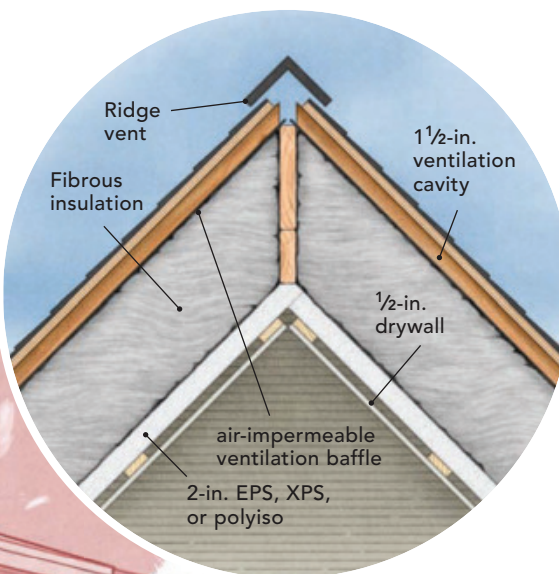
BASEMENT WALLS

Foundations can be insulated from the exterior or the interior. Exterior foundation insulation is prone to damage from string trimmers, UV, and landscaping activities, so it should be protected with a waterproof material. Stucco, metal flashing, and cement board are common choices. Interior insulation needs a fire barrier, usually 1/2-in. drywall. Installing interior foundation foam before pouring the basement slab allows the wall insulation to come in contact with the subslab insulation, minimizing thermal bridging through the footings into the basement slab.



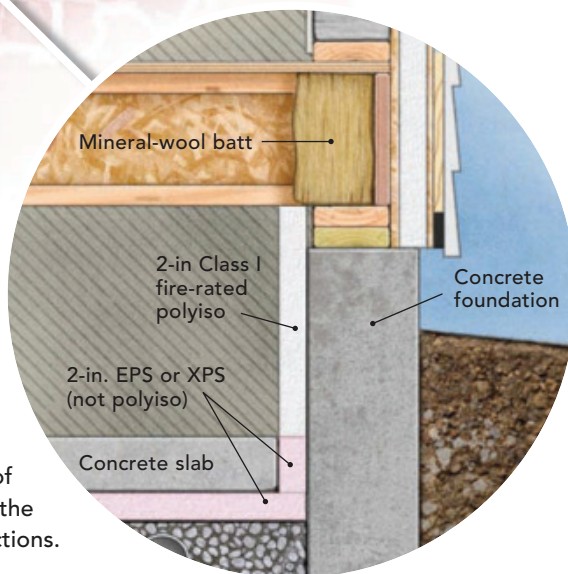
ROOFS

Foam can go on the exterior of the roof sheathing or underneath the rafters. Sometimes the foam is cut to fit between the rafters and placed in layers against the sheathing, but this does nothing to control thermal bridging, so these assemblies should be avoided whenever possible. Although commercial roofs are often installed directly on exterior foam insulation, common residential roofing materials require a second sheathing layer on top of the foam for attachment. Exterior foam must be thick enough to prevent condensation. The thickness, which depends on the climate, is specified in table R806.5 of the 2015 IRC and online at finehomebuilding.com/magazine.



CRAWLSPACES

Conditioned crawlspaces often have a layer of foam on the interior of the foundation walls fastened with concrete screws or plastic cap fasteners (Hilti IDP or similar). EPS and XPS require an ignition barrier (drywall, for instance), but Dow Thermax foil-faced polyiso can often be left exposed in uninhabitable areas. In warmer climates, it's advisable to leave a 2-in.-wide uninsulated gap of exposed foundation at the top of the wall for termite inspections.



GARAGE CEILINGS

Unconditioned garages below living space can exact a significant energy penalty because of thermal bridging and air leaks between the garage and living space. This poor separation between conditioned and unconditioned spaces makes the living space above the garage uncomfortable in both heating and cooling seasons. A layer of taped foam can boost the R-value of the assembly, reduce thermal bridging, and control air leaks. The foam layer is attached to the bottom of the joists and then covered with a layer of 5/8-in. type X drywall for fire prevention.

Should Your Next Dryer Be Ventless?

Condenser dryers don't make sense for every house, but are a great solution when venting isn't an option

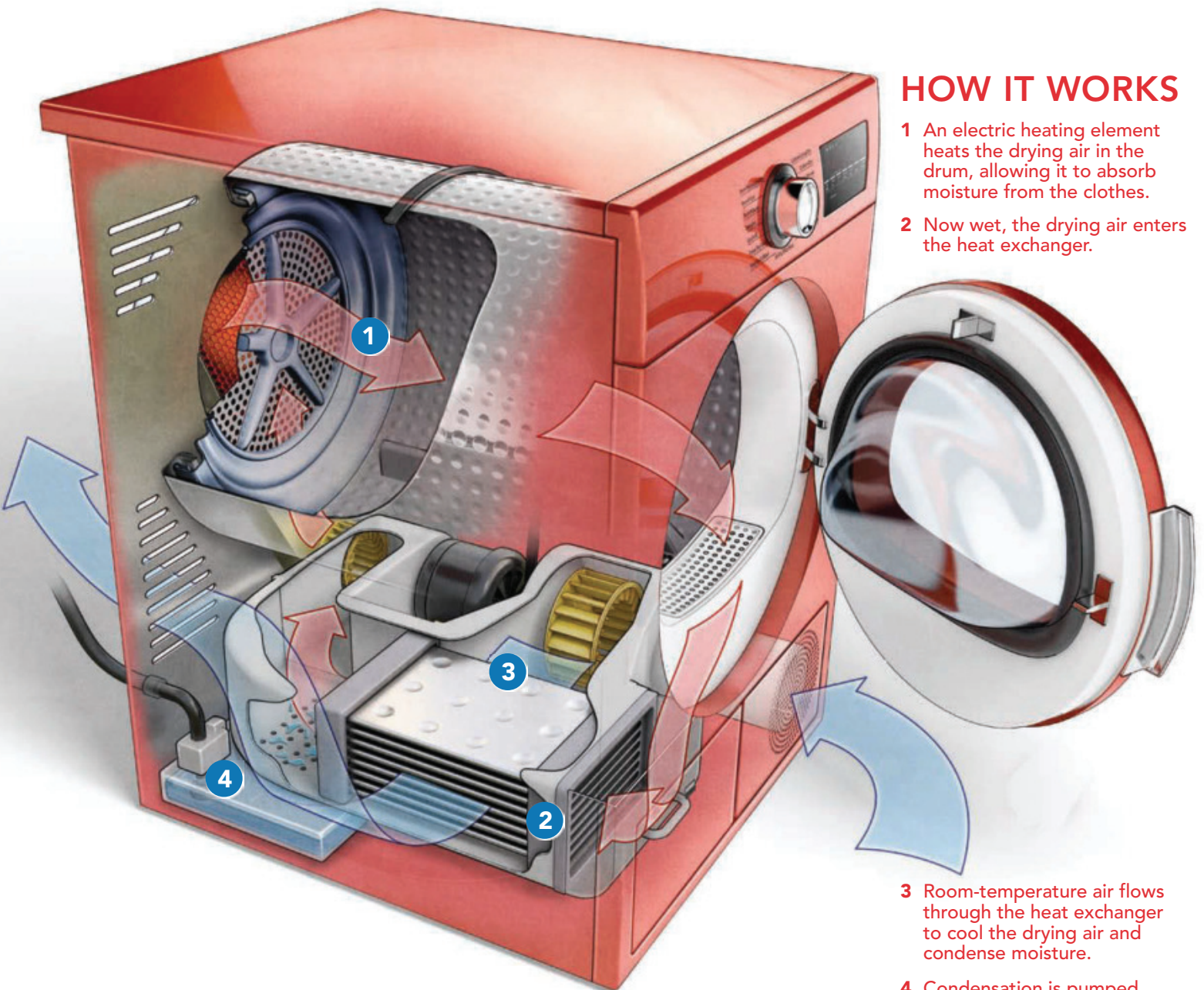
BY KRISTINE KLEIN

HOW IT WORKS

- 1 An electric heating element heats the drying air in the drum, allowing it to absorb moisture from the clothes.
- 2 Now wet, the drying air enters the heat exchanger.

- 3 Room-temperature air flows through the heat exchanger to cool the drying air and condense moisture.

- 4 Condensation is pumped from the machine to a drain.



Most dryers sold and installed in the United States continuously draw fresh air from the laundry room, heat it before it picks up moisture from the wet clothes, and then vent the hot, moist air out of the house. Not only is this a literal energy suck, but if you don't have the space for lengthy ductwork or want to locate your laundry room against an interior wall, you'll have to make a choice: hang a clothesline, or go with an unvented dryer.

There are two types of dryers that do not need to be vented outside. The first type, commonly referred to as "ventless dryers" or "condenser dryers," have an electric heating element (as shown in the drawing on the facing page). Through a heat-exchange process, the air used to dry the clothes releases its moisture inside the machine and can therefore be reheated and reused throughout the drying cycle—no need for venting.

The second type, known as "heat-pump dryers," use the same technology as an air conditioner (running in reverse) to heat the air used to dry the clothes. As the air passes through the heat pump, the cold coil condenses the water vapor and the hot coil heats up the air to be recycled. Again, no need for venting.

Both condenser dryers and heat-pump dryers have either a pipe or tank to drain or collect the condensation. Some offer both options.

Both condenser and heat-pump dryers can be placed just about anywhere within the house, but factors such as speed, capacity, cost, and energy usage should be considered before you add an unvented dryer to your laundry room.

Not all small dryers are ventless, but most condenser dryers on the market in the United States are 24-in. compact models. This is because they are commonly chosen as a necessity when space is limited and there isn't ample room to install ducting. Heat-pump dryers, on the other hand, often have a drum capacity similar to conventional dryers.

Unvented dryers have longer cycles than traditional vented machines because of the heat-exchange process, which requires ambient air to serve as a coolant—and the catalyst for condensation—for the wet air exiting the drum. This process lengthens the drying-cycle time. When it comes to drying times, conventional vented models remain the quickest, condenser dryers are the slowest, and heat-pump dryers stand somewhere in the middle.

Vented dryers are the most affordable option, while heat-pump dryers are the most expensive. But both types of unvented dryers are more energy-efficient than common vented models. Heat-pump dryers in particular are known to require as much as 50% less energy than conventional ducted dryers. □

Kristine Klein was *Fine Homebuilding's* editorial intern.



KNOW BEFORE YOU BUY

- Expect drying to take longer than it would with a vented dryer. Most models have speed settings that get the job done faster, but are less energy efficient.
- Condenser dryers are tempting for their ease of installation, but have some inherent trade-offs and require additional maintenance you should be aware of before making a purchase.
- Dirty lint filters extend the drying time and increase energy consumption, so they should be emptied after each cycle. The heat exchanger also traps lint; it should be cleaned out with water every few months.
- If the dryer relies on a water-collection tank, not a drain, to dispose of condensate, the tank must be emptied every two to four loads, depending on load size.
- Throughout the unvented drying cycle, the temperature of the room will increase a bit; less so with a heat-pump model.
- Condenser dryers don't get as hot as vented models and are therefore gentler on your clothes, which is better for them in the long run.

AT A GLANCE

Capacity 4.3 cu. ft., 24 in. wide (condenser); 7.4 cu. ft., 33 in. wide (heat pump)

Cycle length
Up to three hours

Manufacturers Bosch, Electrolux, Kenmore, LG, Miele, Whirlpool

Estimated price
\$1000 (condenser)
\$1400 (heat pump)



Magnificent Mountain

Designed to tread lightly on the land and with minimal amenities, this family retreat is still built to last



Cabin

BY ROB WOTZAK

Two generations of Maggie and Ron's family live on a rural property in northern Vermont, and it's not unusual for four generations to visit at a time. This small cabin, located on a remote corner of the family land, is a favorite place for everyone. At times it serves as a guest house for friends, and the couple also hosts parties there. Maggie and Ron are especially pleased that it fulfills their original objective as a private retreat, free from the distractions of the modern world. They envisioned it as a place to take breaks from their busy work lives, where they could curl up with a good book, warm themselves by the woodstove on a cool evening, or just sit and take in the beautiful view.

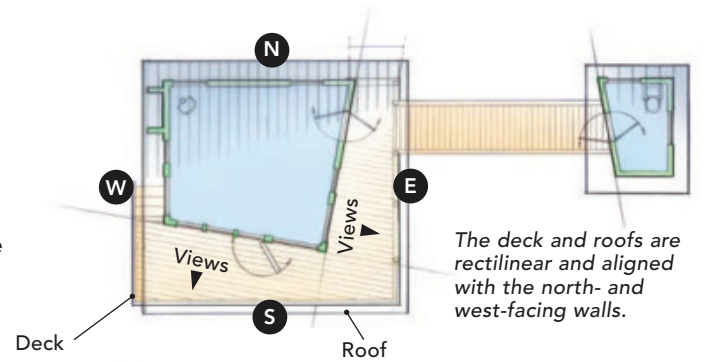
As purposeful as this all sounds, it was actually a random act of nature that precipitated the cabin's conception. While working on an overall landscape plan for the family property, garden designer Ed Burke discovered that a stand of white pine trees had blown down and revealed a panoramic view of a nearby mountain range. He suggested that a screened-in lean-to would be a perfect addition—a structure that would sit lightly on the site and allow Maggie and Ron to enjoy the rugged clearing and the spectacular vista it created.

Ed enlisted the help of his husband, Boston architect David Flaschenriem, to design the simple building. As the designers and homeowners worked on ideas for the project, the concept grew from a simple shed for keeping out rain and mosquitoes into a cabin that could comfortably accommodate guests throughout the

Decked out. To make as little impact as possible on the mountainside landscape while capturing the stunning view across the valley, this family cabin is built on piers and navigates the sloped site with a ramp, a wraparound deck, and a boardwalk from the cabin to the outhouse.

OUT OF SQUARE, ON PURPOSE

While the roof, deck, and north- and west-facing walls are all aligned with and square to the hillside slope, the south- and east-facing walls are set at an angle. Though they were designed to maximize views, these angled walls add lots of visual interest to the cabin. In this way, each aspect of the design is either functional or intended to accentuate the unique modern aesthetic.



The deck and roofs are rectilinear and aligned with the north- and west-facing walls.

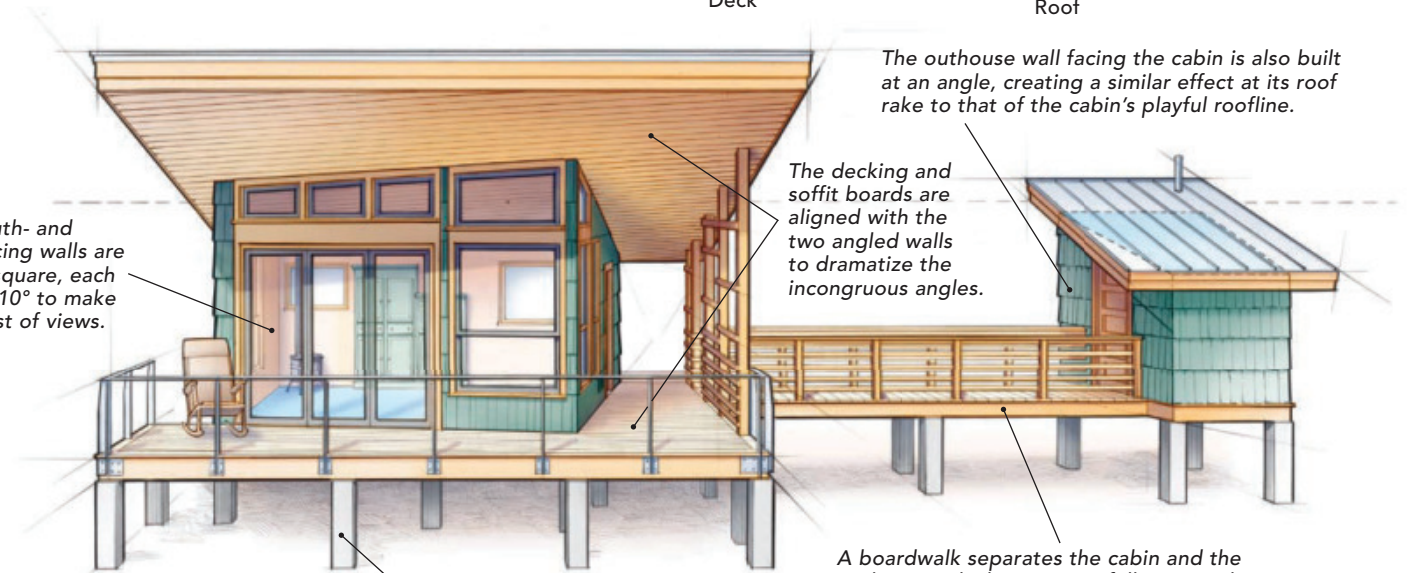
Deck

Roof

The outhouse wall facing the cabin is also built at an angle, creating a similar effect at its roof rake to that of the cabin's playful roofline.

The decking and soffit boards are aligned with the two angled walls to dramatize the incongruous angles.

The south- and east-facing walls are out of square, each turned 10° to make the most of views.



A pier foundation minimizes construction impact on the site. For style, the square piers were poured in site-built forms.

A boardwalk separates the cabin and the outhouse, which is purposefully situated to hide the cabin from the driveway.

See more photos of this cabin at FineHomebuilding.com/magazine.



Vermont traditions. The builder used random-width boards recycled from a 19th-century house for paneling on the ceiling. The cabin's owners picked transparent yellow milk paint to showcase the grain of the rough-sawn shiplap wall paneling.





Natural cedar and painted pine. The decking and trim is all unfinished white cedar, which will age to a natural gray color. The unusually tall 20-in. painted shingles were hand-cut on site from white-pine slabs.



Sandblasted steel. The east and west sides of the deck have white-cedar railings. On the south-facing side, a stainless-steel cable railing exposes the view. The builder sandblasted the railing to remove its sheen.

year. But they held fast to their commitment to creating a place with few amenities, and one that required little maintenance.

Because the best views are to the southwest, David came up with a clever plan. He designed most of the structure parallel to the main axis of the hillside, but turned the angle of the south- and east-facing walls 10° to face the view. Aligning the cedar decking and soffit boards with these walls adds a sense of movement to the design.

Maggie and Ron wanted to retain as much of the native landscape as possible, and a pier foundation seemed to be the least invasive solution. But with two-dozen piers needed, building the foundation was no simple task. Though it took a fraction of the concrete needed for a basement or crawlspace, the piers required nearly as much excavation as a typical foundation to make room for the site-built forms and to get everything deep enough to stay put through Vermont's winter frost. And it was no small feat to plumb and level the forms so each pier lines up perfectly with its corresponding point on the complex floor framing.

The grid of concrete columns ended up looking taller than expected. It took a fair amount of fill and boulders to soften the transition between the house and the existing topography, but once Ed flanked the cabin with native plants and shrubs, the construction site quickly began to blend back into its wild surroundings. Though the look of the

cabin is strikingly modern, the muted colors and matte finishes also help it blend in with the surrounding trees and rocks.

Salvaged lumber from old barns and farmhouses and locally milled timber are abundant in Vermont. Aside from the stone hearth and the metal roof and railings, every visible surface is made of these materials. The roof is the cabin's flashiest detail, but standing-seam roofs are common in Vermont because of their excellent snow-shedding qualities.

Even though this is a simple cabin, which only occasionally needs heat from the Vermont Castings woodstove, the builders—Smith & McClain of Bristol, Vt.—didn't

the roof to be used for cleaning tasks and to water plants. And to make the cabin comfortable for extended visits, there's a Sun-Mar composting toilet in a small building across the deck, which Maggie dubbed "La Poopière"—presumably to make it sound more inviting to outhouse-averse guests.

After some deliberation, Maggie and Ron did opt for an electrical hookup to power lights and a ceiling fan, but they believe they could do without electricity because they tend to use candles as their primary lighting.

It may seem odd to design and build such a refined little abode while simultaneously working so hard to omit most of the con-

"...they held fast to their commitment to creating a place with few amenities, and one that required little maintenance."

skimp on the comfort and weatherization details. After filling the floor, walls, and ceiling with mineral-wool-batt insulation, they covered the interior framing with Intello Plus, a smart vapor retarder. To further keep moisture at bay, they wrapped the exterior sheathing with Benjamin Obdyke's Slicker HP, a good match for the pine shingles.

There's no running water in the cabin, but a large rain barrel captures runoff from

veniences many of us demand in our own homes. But this rustic retreat works exactly the way the couple intended. As Maggie puts it, "I don't feel as if we have given up a thing—this cabin is a luxury to me because of what it allows us to do and experience." □

Rob Wotzak is a carpenter, blacksmith, artist, and freelance writer in New Milford, Conn. Photos by Susan Teare.

Crash Course in Conduit

After buying a fixer-upper north of San Francisco, a carpenter friend of mine wanted to install a workbench in the garage to tackle some projects. The problem was, there weren't enough outlets to make efficient use of the space. When he asked me for help, one solution immediately came to mind: surface-mounted boxes connected by electrical metallic tubing, referred to as EMT.

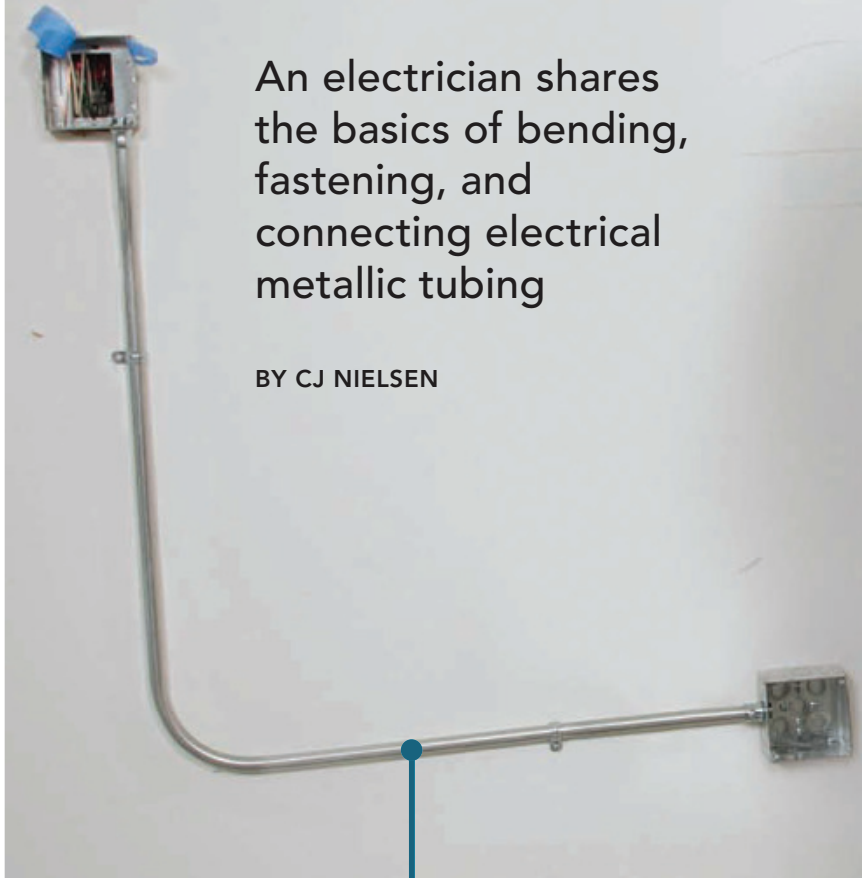
Although the sleek, industrial look of EMT is finding a niche in industrial interiors, where it's used as a design element to add interest to a room, it's mostly called upon for its low cost, durability, and ease of installation. It has become a standard for garages or workshops, where it's tough thin-walled steel or aluminum construction can take a beating. It's often used to retrofit new electrical outlets, switches, and other devices onto existing walls. It's especially useful on concrete or block walls, and in other situations where obstructions don't allow wiring to run in the walls.

In my friend's garage, the wiring is typical of residential homes—nonmetallic sheathed cable hidden behind drywall. While there are no obstructions, using EMT meant I didn't have to open up the walls (or patch the drywall afterward), and it'll be easy to run additional electrical devices off of it in the future.

Laying out surface-mounted EMT

Before bending any conduit, install all your electrical boxes—both the new boxes and the extension rings on the existing boxes that you're going to tap. All measurements will reference off these.

When deciding where to put new boxes, envision how the conduit is going to get there from existing boxes. It's best to avoid putting new boxes in places that require lots of bends. The electrical code only allows 360° worth of bends between



An electrician shares the basics of bending, fastening, and connecting electrical metallic tubing

BY CJ NIELSEN

WHAT IS EMT CONDUIT?

Several types of conduit are used to create “raceways”—the industry term for an enclosed channel that holds wires—but all share the same basic form and purpose: They're all tubes that protect wiring. EMT is among the most affordable and simple types of conduit to work with, and can be used both indoors and out. EMT is produced in diameters from 1/2 in. to 4 in., and usually comes in 10-ft. lengths. It's typically made of zinc-coated steel, but also comes in aluminum, which weighs less. Despite its rigidity, EMT is easily bent around obstacles and connects to boxes with fittings—a little like plumbing, but easier.



LAY IT OUT

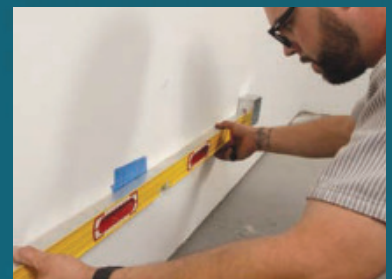
When laying out electrical boxes for conduit runs, keep in mind that you can only have 360° worth of bends between pull points (openings through which you can feed and pull wires). Use painter's tape and a level to accurately locate and mark plumb and level lines for box and bend locations. Measure tight to the boxes, keeping your accuracy within about 1/16 in.



Level boxes. When attaching the boxes to the wall, use a torpedo level to ensure that they're plumb and level before tightening. Crooked boxes look off, and they can stress the conduit, making it difficult to mount to the wall and more likely to pop off in the future.



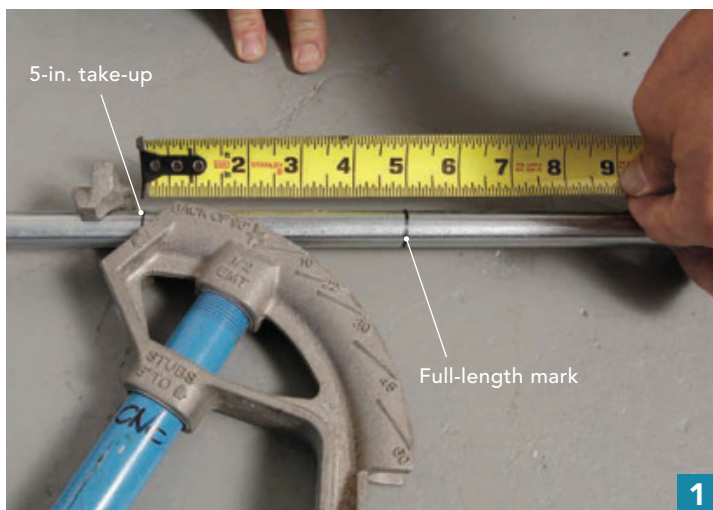
Mark plumb lines. Hold the level to the edge of the box's knockout that's in line with the outside of the 90° stub bend.



Mark level lines. Hold the level to the edge of the other box's knockout that's in line with the outside of the 90° stub bend.

BENDING BASICS

Bending conduit is more science than art. There's a formula to determine the distance between bends for offsets (see drawing p. 79), and simple math for determining where to bend for stubs. Some people guesstimate where to make bends, but doing it by the book gets solid results every time.



Subtract the take-up. Conduit benders indicate the take-up dimension (5 in. for $\frac{1}{2}$ -in.-dia. EMT) used to make 90° bends. After marking the total distance from a box to the outside of a bend (or one bend to the next) on the EMT, subtract the take-up and mark it on the EMT as well. For example, if you're using $\frac{1}{2}$ -in.-dia. EMT and the distance from box to bend is 20 in., measure 20 in. from the end of the EMT and mark it, then subtract 5 in. (to 15 in.) and mark that spot as well. This is the mark you'll use to align the bender.



Measure to length. After bending a stub, the leg you measured should be the proper length; now the other leg needs to be cut to length. Lay the bent EMT on the floor, and lay a bender or other straight edge along the stub as a reference. With the end of the tape measure butted against this straight edge, measure and mark the length of the other run.

"pull points." Pull points are openings in the conduit system that you can pull wires through (see photos p. 81). It's possible to add pull points to allow for more bends, but this adds time, complexity, and cost.

If you're working on a finished stud wall, it's helpful to locate the boxes directly over the studs for easy attachment. When going into drywall between studs, hollow wall anchors are the only option. I like to use Snap toggles because they hold strong and are easier to use than standard toggle bolts.

To mark the layout, I put painter's tape where boxes and bends will go. Then I can draw various measurements, level and plumb lines, and fastener locations on the tape without marring the wall. If I want to move something, it's easy to remove the tape and start over.



Bend slowly. With the EMT on the floor, align the bender's arrow (across from its hook) with the second (take-up) mark, and bend toward the first (full-length) mark. Pull the bender handle toward you slowly (foot pressure on the bender shoe helps get it started) until the bend reaches 90°. Check for accuracy with a level or large square.



Cut it square. Cut the conduit using a saw with a metal-cutting blade, or use a specialty conduit cutter.

Think about future needs when doing the layout. If your boxes have a lot of knockouts (the metal discs that pop out to allow wires to run in and out), choose the one that will make future additions easier. For example, if your conduit run is going down and to the right, use the knockout on the bottom right.

Before adding extensions to existing boxes, make sure the circuits are off, and test all devices in the box before you open it up.

Bends are often unavoidable

Often, the easiest and fastest way to achieve a change in direction in conduit is to bend it. For consistently good results, get accurate measurements and use simple formulas to calculate where to mark and

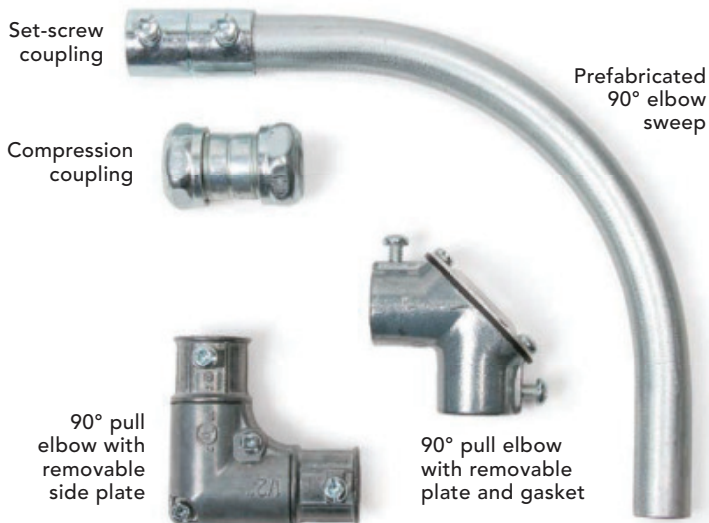


Check for fit. After bending a stub and cutting it to length, check that it fits well between the boxes. If it's too short, start over. If it's too long, trim as necessary.

STORE-BOUGHT BENDS

There's more than one way to get to 90°

Bending isn't the only way to change direction in conduit. Fittings can be used in place of some bends. Prefabricated EMT elbows attach to straight lengths of EMT with couplings, while various pull elbows can make it easier to fit into tight corners and to pull wires.



bend the conduit (a couple are provided here; others are easily found online or in bender instructions).

Manual EMT benders come in different sizes for different diameters of conduit up to 1 1/4 in., and are the standard tool of the trade. Manual benders all have marks for various angles and to align conduit for bends. Each size bender has a different bending radius that is taken into account when making bends. The "take-up"—the number of inches a 90° bend (called a "stub") will account for in the overall distance from a box to a bend location—is usually marked on the bender.

For example, with 1/2-in.-dia. EMT, the take-up is 5 in. So, if there are 20 vertical inches from the box to the bend location, there are just

Calculating offsets

A simple formula is all it takes

Offsets are used to avoid obstructions or make transitions from one height or wall plane to another, and are made up of two bends of the same angle. Among the most common offset bends is the "box offset," which is comprised of two 10° bends—one to kick the conduit out from the wall or ceiling, and another to bring it back parallel to the surface and square into the box.

Step 1 Measure the distance between the two planes you want to connect (e.g., the distance from the wall to the box knockout).

Step 2 Choose an appropriate angle for the offset. Shallow bends make pulling wires easier, but steeper bends take up less space. The angle chosen determines the multiplier

Common multipliers for bending conduit

Degrees of bend	Multiplier
10°	6
22°	2.6
30°	2
45°	1.4
60°	1.2

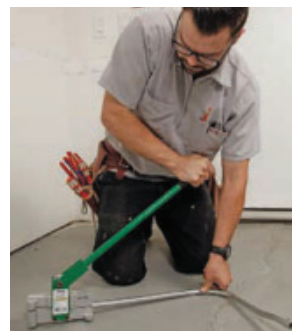
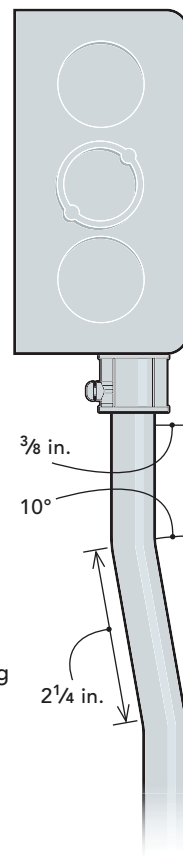
used to figure out where to mark the conduit for bending (see table left).

Step 3 Calculate the distance between bending marks. To do this, multiply the depth of the obstruction by the multiplier from Step 2. For a 3/8-in. box offset, a 10° angle is typical, and the

multiplier for that angle is 6. The math works out to 3/8 in. x 6 = 2 1/4 in. This is the distance between bending marks.

Step 4 Mark the first bend in the conduit, extending the line all the way around the tube. If doing a box offset, I make the first mark 2 1/4 in. from the end (this is arbitrary, but it works). For other types of obstructions—say, a step down—measure to the edge of the step. From this first mark, add the distance computed from Step 3 and mark it on the conduit, again drawing the line all the way around.

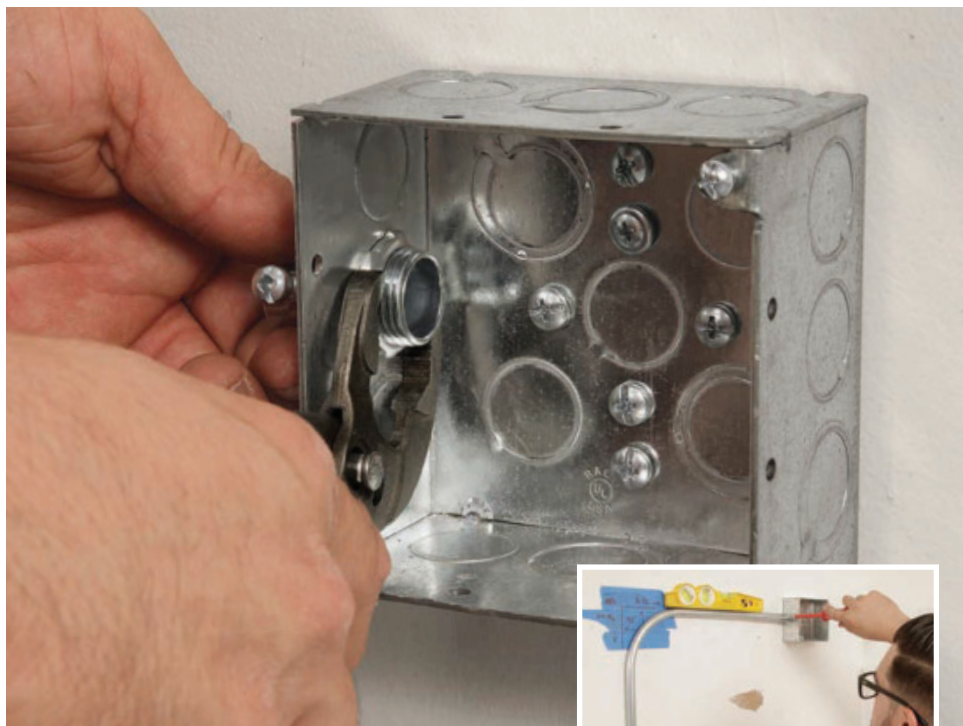
Step 5 Make the bend closest to the end first, then rotate the EMT 180°, slide it to the second mark, and make the next bend.



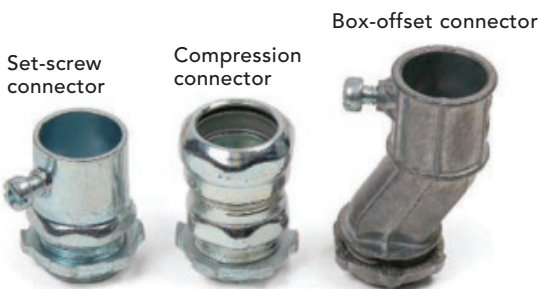
Offset for boxes. Offset bends are used to bring the conduit from the wall to the plane of the box knockouts, which are typically 3/8 in. out from the wall. I use a special offset bender (about \$250), but a manual bender can do the job as well.

MAKING CONNECTIONS

All EMT connections are made with fittings. Set-screw fittings, which are inexpensive and easy to install, are only allowed in dry, indoor locations. Compression fittings, which are a bit more expensive, are required in wet and outdoor settings, but are also used in dry areas—usually for their sleeker aesthetics.



Install connectors. Before installing the conduit, attach the connector fittings to the boxes, tightening the lock nuts securely with adjustable pliers.



Connect the conduit. Slide the conduit ends into the connectors, and tighten the set screws or compression rings to secure the conduit to the fittings.



Strap it up. Straps are required every 10 ft. along conduit runs, and within 3 ft. of boxes. In hollow walls, use anchors to hold the straps' screws securely.



Screw on bushings. Before running wires, screw plastic bushings onto the box connectors to protect the wires' insulation.

15 in. of conduit running perfectly vertically; the other 5 in. are taken up in the bend.

By code, all bends must have an even radius with no kinks. The relatively large radii of EMT benders helps prevent kinking, but proper technique is also important. Always keep pressure on the conduit as close to the bender as possible for good results.

Cut square and deburr

I like to use a portable bandsaw to cut EMT because it makes quick work of the conduit without binding, but a reciprocating saw with a sharp metal-cutting blade works too, as does a good old hacksaw. When using a hacksaw or reciprocating saw, secure the con-

duit in a vise first. Regardless of the tool, always be sure to cut the conduit square.

Even if done with sharp blades, cutting EMT leaves burrs, which can nick wire insulation. To remove burrs, I use a reamer that hits all of the conduit edges at once, but files and other tools also work. However you deburr, carefully check the edges with your finger to make sure they're smooth.

Don't fight it

When fitting conduit to boxes, the conduit should bottom out in the fittings and lay flat against the wall without putting pressure on it. If you have to fight it, something's not right. Assuming the lengths

RUNNING WIRE

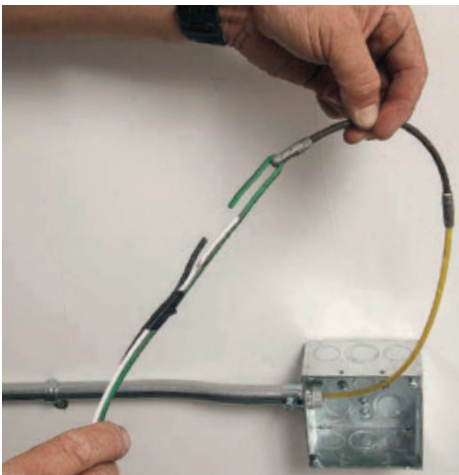
Running wires through conduit isn't hard, but fish tape can help on long runs or runs with lots of bends. Lots of electricians have their own techniques for attaching wires to the fish tape. When pulling wires, it helps to have an assistant feed them into the conduit to keep them from getting hung up.

EMT-conduit fill tables can tell you how many wires of a given gauge you can run through various sizes of conduit. Here I show some common wire gauges used in 1/2-in.-dia. EMT, but expanded charts are widely available online.

WIRE SIZE	14-ga. wire	12-ga. wire	10-ga. wire
			
Maximum number of THHN wires	12 wires	9 wires	5 wires



Fish-tape anatomy. My fish tape has an eyelet end, rather than a leader, as some tapes have. I prefer this because it's a solid piece that can't spring apart. My Ideal S-Class fish tap costs about \$175.



Tape it up. Wrap electrical tape around the wires, starting about 8 in. down and working your way to the fish tape, finishing with a few loops over the joint between the tips of the wires and a few over the eyelet and up the fish tape's leader.



Stagger the wires. After running the fish tape between pull points, prepare the wires by staggering their ends. One should be about 3 in. longer than the rest. Feed this long wire through the fish tape's eyelet, and bend it back until it's just shy of touching the tip of the next-longest wire.



Mount devices. Devices installed in surface-mounted boxes are attached to the faceplate rather than the box. Break the ears off the device with pliers and attach the cover to the device with the provided screws.

are correct, tweaking bends and checking the boxes for plumb can often get things where they need to be. If you try to force a length of conduit into position, it'll fight the straps as long as it's on the wall or ceiling. Eventually, it could spring loose.

Straps are required every 10 ft. or less, and within 3 ft. of any box or enclosure. For a neat look, try to space the straps evenly.

Working with wires

Different numbers and sizes of wires are allowed in different sizes of conduit (see "Running Wire," above). It's possible to run solid wire with conduit, but I typically use stranded wire because it's easier to pull it through, especially on long runs and runs with lots of bends. On

short runs with minimal bends, it's usually possible to push the wires through. On longer runs, use a fish tape—a flexible line that can be pushed through the conduit and pulled back with the wires attached to it. Whether fishing or pushing, run all of your wires at the same time to keep them from hanging up.

When attaching your switches, outlets, or other devices to surface-mounted boxes, remove the device's ears and screws first and then mount the device to the cover plate, which includes its own set of hardware for easy attachment. □

CJ Nielsen is an electrician in Northern California. Photos by Matthew Millham, except where noted.

project gallery

HIGHLIGHTS FROM FINEHOMEBUILDING.COM

Walk-ins that wow

A walk-in closet that maximizes storage in every inch of usable space is a dream come true for many of us. A well-designed walk-in helps keep clothes and shoes organized and streamlines the morning routine. An accomplished closet designer knows how to best group together a client's items, and then tailor the closet to work well with the way they live. Here are a few inspirational examples of well-designed closets outfitted with hanging areas, drawers, shelf dividers, and shoe and purse storage; some even include jewelry storage and clothing hampers, and all are customized to meet the owner's needs.

—Maureen Friedman



Modern luxury

The large center island of this 30-ft. by 20-ft. luxury closet has pullout jewelry drawers with blue-velvet custom valet trays, deeper drawers for folded items, and a concealed hamper with compartments for both laundry and dry cleaning. Maple plywood painted a silver-grey with a mother-of-pearl finish was used to construct the cabinets, which are topped with Quartzite slabs. Hanging items are housed in three-sided, 25-in.-deep boxes, some with frameless glass doors. Each box is lined in the front with vertical and horizontal LED strip lighting. To showcase the homeowner's extensive purse and shoe collection, one end of the closet is designed to feel like a high-end shoe boutique. Items are kept organized and dust-free behind cabinets outfitted with frameless glass doors, LED lights, and adjustable shelving. Grass cloth covers the walls and ceiling and a silk-pile carpet covers the floor. In addition to the elegant Conrad shades, each window is also fitted with an automatic pull-down blackout shade for privacy. Since the large window faces north, there is no risk of sun exposure to the clothing.

Designer Kathleen Jacobson, The Couture Closet, Dallas, thecouturecloset.com

Custom cabinetry Thompson Woodworks, Seven Points, Texas

Photos Steven Karlisch, courtesy of The Couture Closet





Sweet suite

An extensive master-suite renovation of a colonial-style home included the construction of this 12-ft. by 17-ft. walk-in closet. It's located at the back of the house, overlooking gardens and conservation lands, and the house's rooflines were changed to create more usable floor space as well as let in more natural light. The closet was thoughtfully designed to include custom-built shelving for shoes and sweaters, built-in drawers for storage under the eaves, and plenty of space for hanging garments of various lengths.

Designer Elizabeth R. Swartz, ASID, Elizabeth Swartz Interiors, LLC, Boston, elizabethswartzinteriors.com

Renovation and custom cabinetry Premier Builders Inc., Georgetown, Mass.

Photos Eric Roth Photography, ericrothphoto.com



Santa Fe chic

Elegant and organized, this 11-ft. by 11-ft. walk-in closet is outfitted with 24-in.-deep boxes constructed of oak and finished with a clear coat. Tall hanging areas accommodate longer jackets and dusters, while shorter hanging areas make room for scarves. The built-in dresser at the rear of the closet includes custom-designed jewelry trays. A full-extension, divided built-in hamper separates items to be dry cleaned from regular laundry. Valet rods help organize a day's outfit and simplify packing for trips. A skylight, recessed can lights in the ceiling, and an LED strip in the dresser illuminate the closet. The floors are stained exposed concrete in a cola color and the walls have a plaster finish. A pair of hand-carved burlwood benches found in a Santa Fe antique store makes the space even more inviting.

Designer Kathleen Jacobson, The Couture Closet, Dallas, thecouturecloset.com

Builder Crest Construction, Rio Rancho, N.M.

Photos Daniel Nadelbach, courtesy of The Couture Closet



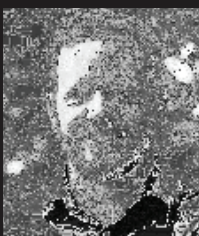
askthe experts

YOUR QUESTIONS—PRO ANSWERS

experts



Justin Fink
editor



Matthew Millham
associate editor



Mike Guertin
editorial advisor

Need help?

Get answers you can trust from the experienced pros at *FHB*. Email your question to Experts@FineHomebuilding.com.

Solutions for small moldings

I do a little bit of everything in my remodeling work, including some finish carpentry, but nothing frustrates me more than dealing with the little miter returns on window casing, crown, wainscot, and so forth. I have a good-quality miter saw with a sharp blade, but I'm still getting mixed results. Got any tips for lowering my blood pressure on these jobs?

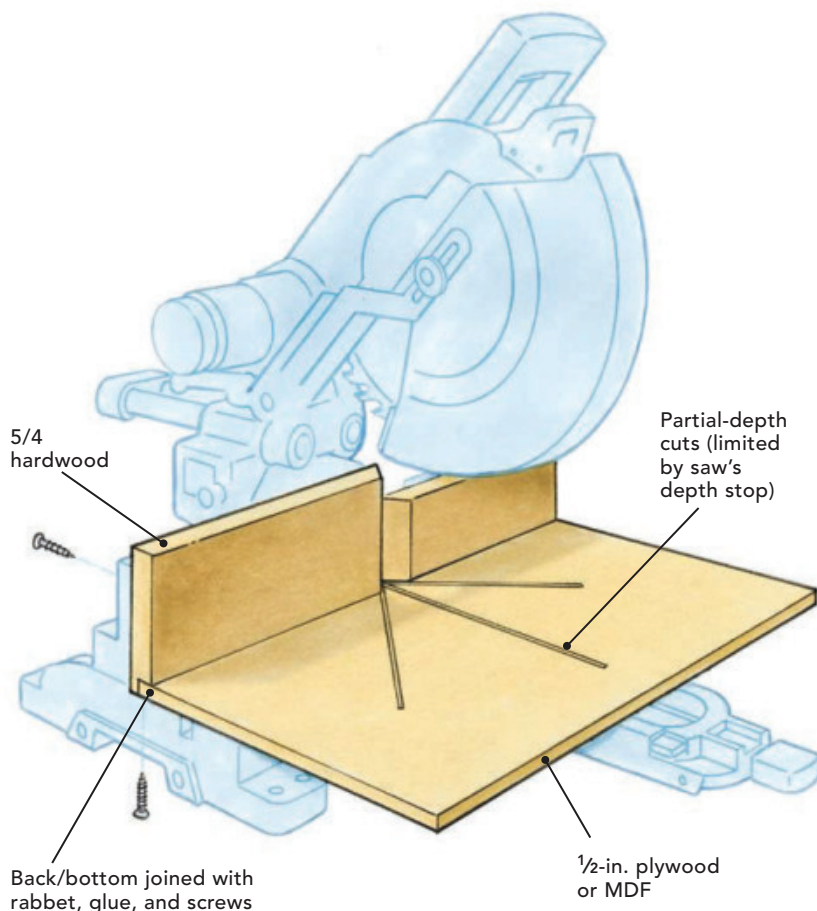
—BILLY
via email

Justin Fink: You're not alone. Working with small moldings and miter returns is like a subspecialty in the world of trim carpentry, and it demands some changes in working habits.

You're on the right track with a good saw and a quality blade, and need to ensure both are set up to make accurate cuts. If they aren't, start there. But even a well-tuned miter saw can be improved.

The trouble is that miter saws aren't particularly well-suited for this work. The trough in the bed of the saw is much wider than the blade, as is the gap between the two upright fences. This means that small moldings are poorly supported, which can lead to tearout on the backside of cuts, and scraps flying dramatically through the air as the blade cuts through them.

Solve these issues by setting up your miter saw with a subfence assembly. I make these L-shaped assemblies out of scraps of hardwood and plywood or MDF, which I join together at a 90° angle with



the help of a rabbet joint, wood glue, and screws that go up into the rear fence and are kept at least a couple of inches from the path of the sawblade.

After assembly, fasten the L-shaped setup to the fence of the miter saw, and ensure it's sitting flat. If it's not tight to the bed of the saw, use some pieces of double-stick carpet tape on the nonadjustable portion of the saw's bed to help keep the base of the subfence assembly from lifting.

Set the saw for a shallow depth of cut—you don't want to cut all the way through the base of the subfence or it won't be as sturdy and accurate—and cut kerfs at the com-

monly used angles. A cut at 90° and two at 45° to the left and right of 90° will have you set for most jobs.

The kerfs in the base of the subfence match the actual thickness of the blade, so it's easy to line up a marked piece and know exactly where the blade will land without trying to sneak up on the cut. Plus, the kerf means both sides of the cut are fully supported, so you won't get tearout.

Having the subfence set up for 45° cuts to both sides of 90° creates a gap in the rear fence that is bigger than the kerfs you just cut in the base, but this is still better than using the stock metal fence of the saw itself, and still offers the same

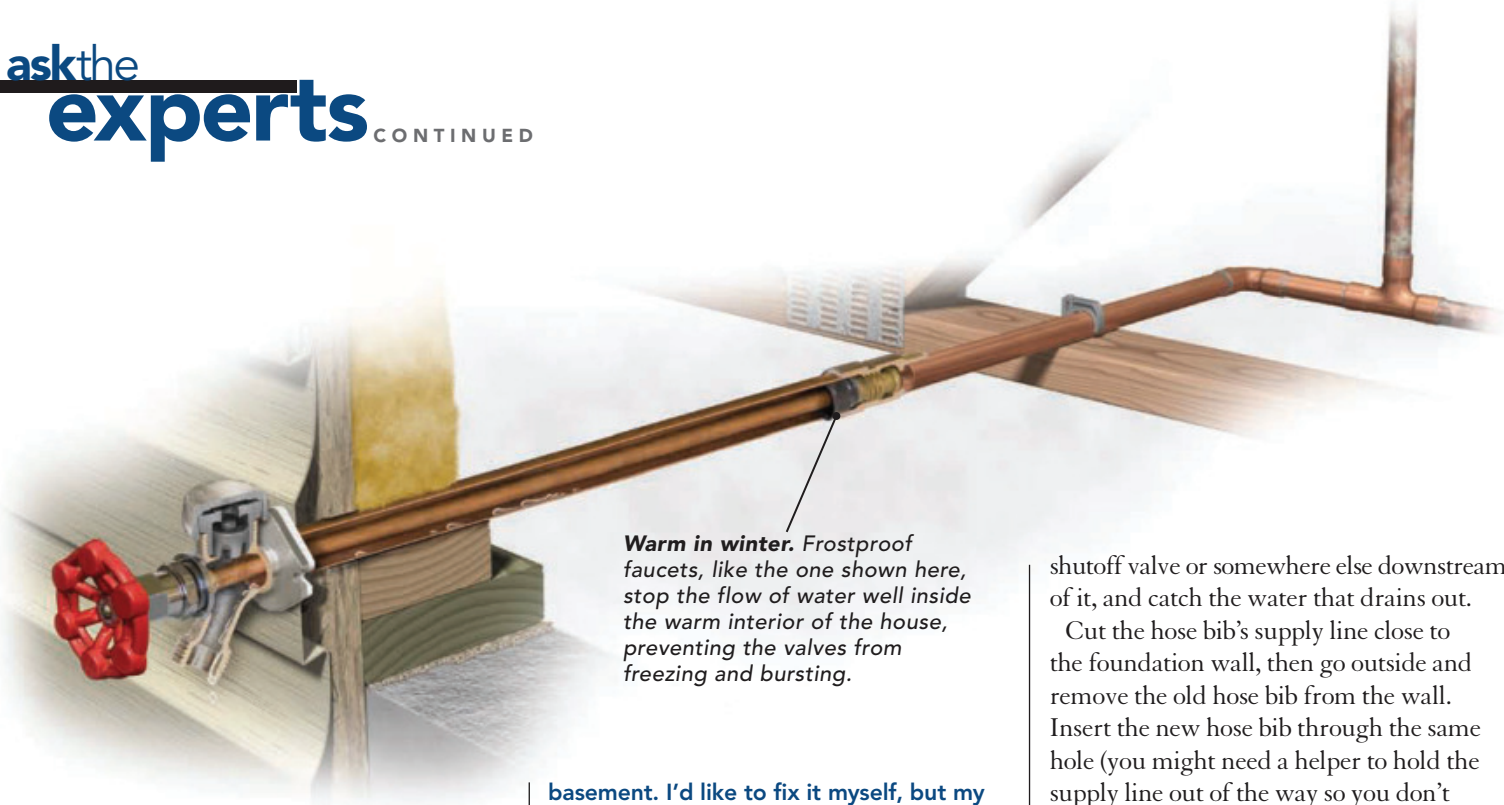


IT'S NOT A TREND. IT'S A REVOLUTION.

Visit ZIPRevolution.com to learn how easy it is to make the switch.

ZIPsystemTM
SHEATHING & TAPE

© 2018 Huber Engineered Woods LLC. ZIP System, the accompanying ZIP System logo and design are trademarks of Huber Engineered Woods LLC. Huber Engineered Woods' ZIP System® products are covered by various patents. Please see ZIPSystem.com/Patents for details. HUB 16509 03/17



Warm in winter. Frostproof faucets, like the one shown here, stop the flow of water well inside the warm interior of the house, preventing the valves from freezing and bursting.

basement. I'd like to fix it myself, but my plumbing experience is, well, nonexistent. Do I have any options?

—TODD EVANS
via email

benefits of the base kerfs when it comes to alignment and tearout reduction.

When it's time to make cuts, never try to work with a piece less than 10 in. to 12 in. long. This could mean buying more stock than you need, but having your fingers that close to the blade on small, flimsy moldings is not worth the risk. It's also best to always move the blade through angled cuts so that you're entering the wood at the short point and exiting at the long point, not the other way around. When you cut a piece of wood "downhill"—long point to short point—it will leave you with a rougher cut. Finally, always let the sawblade spin to a complete stop before lifting it out of the cut. This will help eliminate the risk of projectile offcuts and also improve the smoothness of the cut.

Shutoff that won't shut off

I bought a 50s-era house in upstate New York that has a hose bib mounted to the foundation outside, and a shutoff valve in the basement. When I set about preparing the house for winter, I realized the shutoff is busted. No matter how much I crank, it won't shut off. I know I have to do something to remedy the situation or my copper pipes might burst and flood the

Matthew Millham: If you want to kick the can down the road a bit, you can cut the copper supply line to the existing hose bib and terminate it with a push-fit end-cap fitting (as the name implies, the fitting connects to the pipe by simply pushing it on). This will isolate the rest of the plumbing system from the outside and prevent a frost-induced flood—but it won't help when you want to water your spring flowers or wash the dog.

A better option is to take this opportunity to upgrade to a frostproof hose bib and eliminate the need for that shutoff. Frostproof hose bibs are designed to control the flow of water with a valve well inside the warmth of the house's interior, where it is safe from the freezing temperatures that led to your problem in the first place.

To do the work, you'll need a new frostproof hose bib, a copper-tubing cutter, a reamer or something else to deburr the copper after you cut it, and silicone caulk. It doesn't sound like you have a plumbing torch or have experience with soldering, but that's ok—hose bibs are also available with push-fit connectors.

Once you've got those things, find the main water-shutoff valve and close it. With any luck, that one still works. Then get a bucket, open the drain plug on the broken

shutoff valve or somewhere else downstream of it, and catch the water that drains out.

Cut the hose bib's supply line close to the foundation wall, then go outside and remove the old hose bib from the wall. Insert the new hose bib through the same hole (you might need a helper to hold the supply line out of the way so you don't bump into it), but don't fasten it. Go back inside, make sure the hose bib is in as far as it will go, and mark its end on the copper supply line. Don't cut at that mark—you need to leave a little extra pipe so that it goes all the way into the fitting on the end of the hose bib. How much extra depends on the brand of the fitting and the size of the supply line. SharkBite is one of the more common brands of push fittings, and a ½-in. supply line goes nearly 1 in. into the fitting before it's seated. Determine the length you need for a proper connection from the manufacturer, and mark it on the pipe (this line should be closer to the foundation wall than the original mark).

Cut the pipe square at your new mark and deburr it. A reamer works best for deburring, but you can use emery cloth or sandpaper as long as you're careful not to scuff the pipe's interior or exterior surfaces. Everything must be smooth to get a good seal and to prevent damage to the fitting.

Depending on how much play you have in the plumbing, you might at this point be able to connect the hose bib to the supply line with the push fitting, and then go outside to finish it off. If there's little to no play, go back outside, put a bead of silicone caulk around the edge of the hole for a good seal, insert the bib, and have a helper connect the fitting to the supply line. Then fasten the bib to the wall with screws, open the shutoff, and test the new hose bib. (Note: The bib must pitch to the outside to drain, and

be disconnected from the hose in winter, or water can remain in the bib and freeze.)

Pilot holes in a deck ledger

What diameter pilot hole do I need when fastening the deck ledger to my house, and is it the same-diameter hole if I use lag screws instead?

—CLIFF
via email

Mike Guertin: First, let's differentiate between the types of drilled holes for bolts vs. lag screws. You need to drill a clearance hole where you want a bolt or screw to pass freely through the ledger and rim joist. Lag screws are different, though. For those, you need to drill a pilot hole that accommodates the shank of the lag screw, but not one so large that the threads of the screw have no wood to bite into.

A clearance hole for a 1/2-in. bolt should be between 17/32 in. and 9/16 in.—slightly larger than the bolt itself. Drilling the hole with a 1/2-in. bit ups the risk of the ledger board splitting. Pressure-treated lumber is often still wet from the treating process, and as the board dries, it can crack along the bolt-hole line. Going too large is also a problem. 5/8-in. or 3/4-in. holes for 1/2-in. bolts reduce the load value of the bolt and washer through the ledger and rim.

Like through-bolts, lag screws require a clearance hole of 17/32 in. to 9/16 in. (but no greater) through the ledger board. A smaller diameter pilot hole that equals the root diameter of the threaded portion of the lag screw (usually 5/16 in.) needs to be drilled through the wall sheathing and rim joist. Properly sized pilot holes ensure that the threads of the lag screws engage with the wood for a secure connection. Undersize pilot holes—or lag screws driven through wood without a pilot hole at all—can split the rim joist and significantly reduce the strength of the screwed connection. And oversize pilot holes don't let enough of the screw threads lock into the wood fibers and will also reduce the connection strength.

It's worth noting that there is a third option as well. Structural screws, which are offered by many fastener companies, can be used to create a code-compliant ledger connection, and in most cases don't require any pilot holes.

FineHomebuilding®

Shop Our Online Store

FineHomebuilding.com/ShopNow

YOUR DESTINATION FOR
TRUSTED BUILDING KNOW-HOW

mafell

Z 5 Ec
12" Portable
Bandsaw

-120v Motor
-Ultra Light
-Cuts 12" Timbers



TIMBERWOLF
TOOLS

800-869-4169
timberwolftools.com



Your best source for
the world's finest
Timber Framing Tools

Eliminate Exterior Blemishes With A Modern Vent

Occasionally Beauty IS A Beast



Shown Half-Powder Coated
Highlighting Galvanized Steel Construction

Sometimes, You Just Have To Look Closely

Dryer Wall Vents aesthetically complement every exterior and are well built. Their underlying strength is thanks to a heavy frame. It stands the test of time.

They perform well as an architectural accent or as a component that blends in.

**Powder Coated
Heavy Gauge
Galvanized
STEEL**

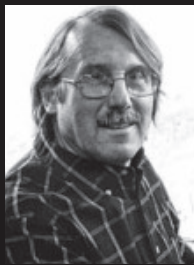


Keep your
beautiful home
exteriors, well...
Beautiful.



DryerWallVent™

www.DryerWallVent.com



"Musings of an Energy Nerd" showcases the best of Martin Holladay's weekly blog at GreenBuildingAdvisor.com, where he provides common-sense advice about energy issues to residential designers and builders. His conclusions usually fall between minimum code compliance and the Passive House standard, which often makes them controversial to both building-science geeks and everyday builders.

Green Building Advisor

Green Building Advisor is for designers, engineers, builders, and homeowners who craft energy-efficient and environmentally responsible homes.

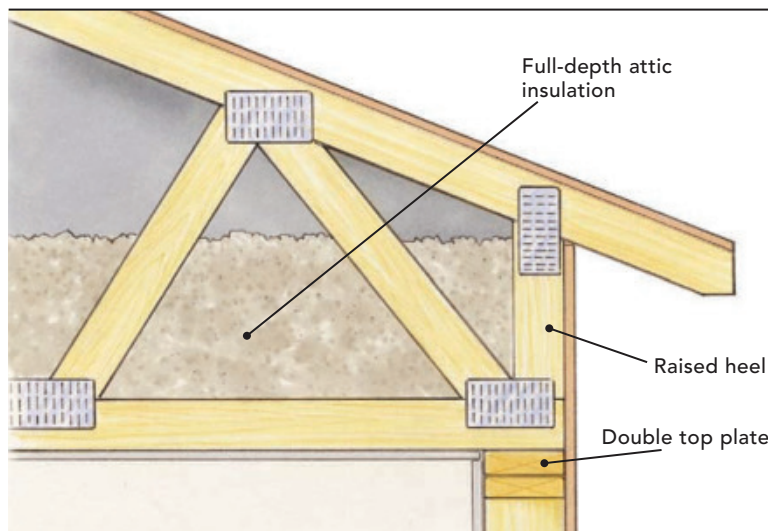
Ten common mistakes made by new home builders

Designers and builders who do their homework before construction begins tend to have few problems. Unfortunately, some projects happen backward: the design and construction are well under-way before the homework begins. That type of project can be problematic.

At *Fine Homebuilding's* companion website, GreenBuildingAdvisor.com, we see examples of the

latter all the time. Designers, builders, or owners in the middle of a project post basic questions on our Q&A page. "I'm looking at the rafters and trying to decide how we should insulate the roof," they write, or "We're trying to figure out the best place to put the HRV."

In hopes of reducing the frequency of these last-minute questions, I'm providing a list of ten common mistakes. Let's banish these blunders.



Mistake #1: Forgot raised-heel trusses (or elevated rafter tails)

Attic or roof insulation should be full-depth over the top plates of exterior walls, not compressed to squeeze between the top of the wall and the roof sheathing.

Raised-heel trusses should be designed to provide enough vertical space for the proper amount of insulation plus about 2½ in. for a ventilation baffle and an air space beneath the roof sheathing.

For a code-minimum home in Alabama, raised-heel trusses might

need only 13 in. of vertical clearance at the top plates, while a Pretty Good House (an informal standard that aims for an ideal mix of affordability, comfort, and efficiency) in northern Maine might need 19 in. of vertical clearance. First, figure out how much insulation you want to install, and then let the truss company know your needs when you place your truss order.

Mistake #2: Mechanical room too small

Make a list of all the different appliances and pieces of equipment that

belong in this room—perhaps a furnace, water heater, well pump, pressure tank, water softener, and HRV—and make sure everything will fit. Remember to include room for ducts and pipes, as well as room to access the various pieces of equipment for maintenance. Then make the room a little bigger.

Mistake #3: Forgot basement-wall insulation

If you are building in climate zone 3 or anywhere colder, your building code probably requires basement walls to be insulated.

Just because it's required doesn't mean it's always installed, though. If your builder says, "No one does that around here," push back or find another builder. Insist on basement-wall insulation.

When it comes to slab-on-grade foundations, the comparable sin is forgetting to install vertical rigid foam at the slab perimeter. When it comes to improving the thermal performance of the foundation, this type of insulation is always a good idea, although it's often omitted—sometimes for a valid reason, such



PREMIUM QUALITY REGISTERS & GRILLES

— AMERICAN CRAFTSMANSHIP —

**Get the Finishing Touch
People Notice**

Check out our newest products at
ReggioRegister.com

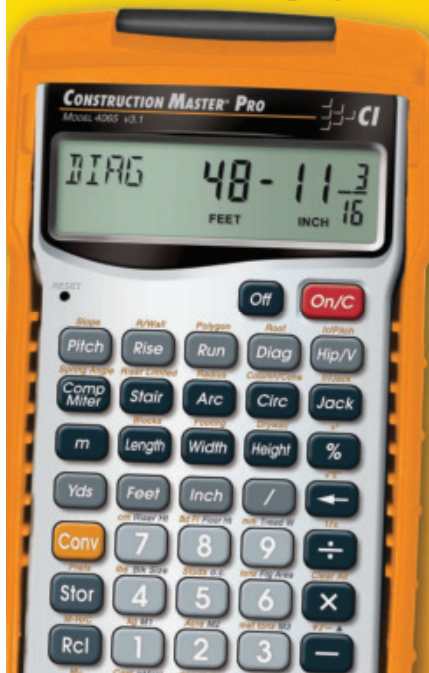


Solid Brass • Cast Iron • Aluminum • Wood

— LIFETIME GUARANTEE —

ReggioRegister.com | 844.834.9949

Improve Accuracy Reduce Costly Errors Save Time



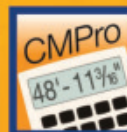
CONSTRUCTION MASTER® PRO

- Solves construction math **fast**
- Accurate, reliable, rugged
- Complete roof, rafter and framing solutions
- Automatic stair layouts – treads, risers, stringers

See how it can work for you:

www.calculated.com

For a dealer near you, call
1-800-854-8075



**Also available
as an app!**

CALCULATED INDUSTRIES®



**COR-A-VENT®
IS THE SOLUTION**

**TRAPPED
MOISTURE IS
THE PROBLEM**

Save Your Siding

**Cor-A-Vent's Siding Vent System:
Your Rainscreen Ventilation Solution**

Trapped moisture can destroy your siding and housewrap before you notice a problem. Cor-A-Vent's Rainscreen Siding Vent System solves that problem before it ever becomes one. Find out how by downloading the Rainscreen Siding Ventilation Guide today at www.cor-a-vent.com

COR-A-VENT™

COR-A-VENT, Inc. • P.O. Box 428 • Mishawaka, IN 46546-0428
Phone: (800) 837-8368 • Fax: (800) 645-6162
info@cor-a-vent.com • www.cor-a-vent.com

OFFICIAL 2016 SPONSOR

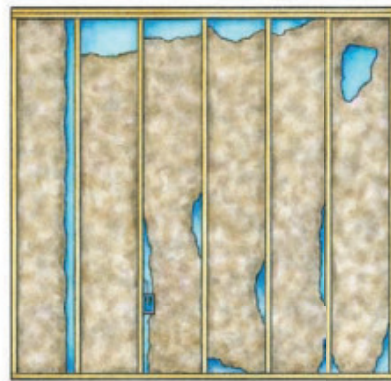
Fine Homebuilding
PROHOME™
Elevating the Standard of Building



Grade I: Almost no gaps



Grade II: Up to 2% missing insulation



Grade III: 2% to 5% missing insulation

Go for Grade I. RESNET breaks down insulation installations into three grades, with Grade I as the highest and Grade III as the lowest. Always aim for a Grade I installation.

as worries about termites, but usually due to basic ignorance.

Mistake #4: **Poorly installed fiberglass batts**

This age-old problem is still with us. Fiberglass batts can be an excellent choice for insulation, but they're often installed incorrectly. If you are the owner, there are a few possible solutions:

If you're hiring an installation contractor, write specifications that insist on adherence to RESNET's Grade I installation standard, and make sure that contractors understand your expectations before they bid. Then supervise, supervise, supervise, with the aim of ensuring that the standard is met.

You could also either do the work yourself, or specify a different type of insulation.

Mistake #5: **Forgot the blower-door test**

If you schedule your first blower-door test at the right time—usually after windows and doors are installed and your primary air barrier is in place—you'll be able to identify leaks in your thermal envelope. It's much easier to locate these leaks and seal them before the drywall is installed, so don't wait until it's too late to schedule your first blower-door test.

Mistake #6: **Oversize furnace and air conditioner**

Almost every new home in the United States has an oversize furnace and an oversize air conditioner. This problem

persists for a few reasons. First, equipment manufacturers don't offer as many low-load options as they should. Second, HVAC contractors have a financial incentive to sell oversize equipment. Finally, most HVAC contractors lack the skills to perform an accurate load calculation.

Builders facing this issue should hire a mechanical engineer, a home-energy rater, or an energy consultant to perform an accurate heating-and-cooling-load calculation. This load calculation can then be used as the basis for proper equipment specification.

Mistake #7: **Ducts in unconditioned spaces**

In some regions of the country, HVAC contractors routinely locate ducts in unconditioned attics or crawlspaces. These ducts are basically outdoors. When ducts are located in unconditioned spaces, the duct systems are responsible for tremendous levels of energy waste.

If you are involved in a residential construction project, you should not compromise on this very important principle: All ducts must be located inside the home's thermal envelope.

Mistake #8: **Recessed can lights in insulated ceilings**

There are at least three reasons why you don't want any recessed can lights in an insulated ceiling.

Almost all recessed can lights—including so-called "airtight" fixtures—leak air.

Because the stack effect causes air near can lights to be pressurized with respect to the outdoors, air leaks in an insulated ceiling cause more problems than air leaks in walls.

Recessed can lights take up space that should be filled with insulation, thereby lowering the R-value of the ceiling insula-



Kick the can lights. Use low-profile LED fixtures (such as Philips SlimSurface LEDs) with shallow, airtight boxes in ceilings. Fiberglass batts are shown here, but cellulose insulation would perform better.

tion. This explains why recessed cans create “hot spots” in your ceiling. In snowy climates, these hot spots can cause ice dams.

When the lamp in a recessed can fixture is turned on, it gives off heat. The hot bulb accelerates the stack effect, pulling more air through cracks near the fixture. Each fixture becomes a heat-loss chimney equipped with its own engine.

There are lots of alternatives to recessed can lights: track lighting, wall sconces, and pendants, for example. Ideally, you won’t need any electrical boxes in your ceiling. If you end up with a few electrical boxes in your ceiling, specify airtight electrical boxes or spend some time air-sealing the holes in the back of each box (where the cable enters the box) as well as the crack between the electrical box and the drywall.

If you insist on the recessed-can look, one alternative is to install the new low-profile LED pancake fixtures that fit into shallow electrical boxes.

Mistake #9:

Forgot to seal duct seams

Duct seams should be like plumbing connections: they shouldn’t leak. If you want your ducts to convey warm air in winter and cool air in summer to the rooms where the air is supposed to go, then you don’t want leaky ducts.

Not every HVAC installer understands this basic principle. Look for evidence of mastic or high-quality tape on all duct seams. If you don’t see signs of duct-sealing work, insist on a duct-leakage test.

Mistake #10:

Hot-water pipes are too long

If a bathroom or kitchen is 30 ft. or 40 ft. away from the water heater, you’re going to wait a long time for hot water to arrive. Long hot-water pipes waste both water and energy.

This problem is best addressed at the design stage. Ideally, the kitchen and bathrooms will be located close to each other and close to the water heater. If that’s impossible, your house may need two water heaters or a demand-controlled hot-water-circulation loop.

Do your homework before construction begins, and you’ll have plenty of time to make all your mistakes on paper. These mistakes are much easier to fix than those made with concrete, 2x6s, and plywood.

Versi-Foam
systems

SPRAY IT. DON'T PAY IT.

THE MOST VERSATILE FOAM SPRAY KIT.

SYSTEM 50

SYSTEM 50

RRHFOAMSYSTEMS.COM **SALES@RRHFOAMSYSTEMS.COM | 800.657.0702**



A Genuine Work of Art

Like a masterpiece created in your own home, a Rumford Fireplace will add a unique element of resplendent beauty. At Superior Clay, we are proven leaders in the fireplace industry, sharing generations of wisdom to create structural clay fireplace components that promise optimal performance, safety, and style for an inviting home and lifetime of treasured memories.

SUPERIOR
CLAY CORP

740.922.4122 | 800.848.6166 | PO Box 352 Uhrichsville, Ohio 44683
www.superiorclay.com

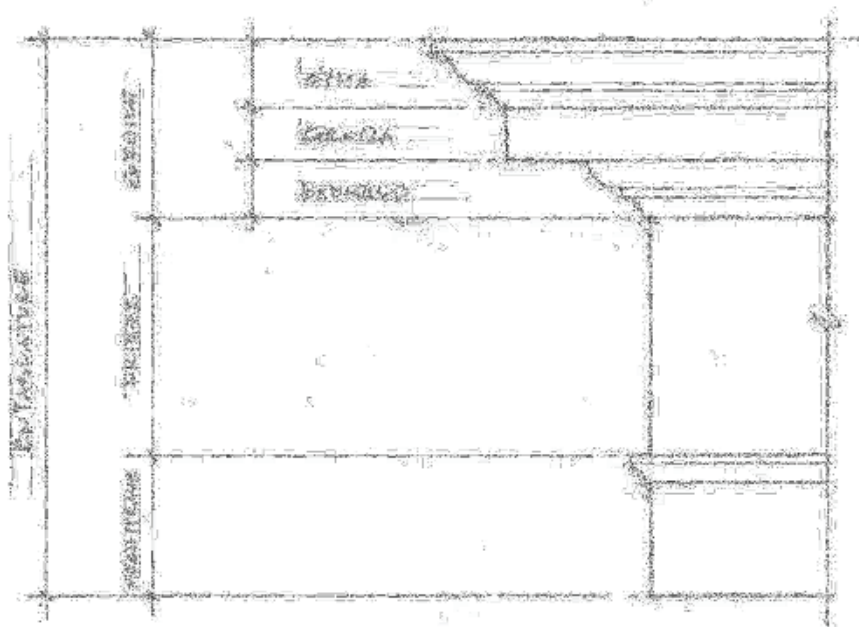
FIREPLACE SURROUNDS

BY MARIANNE CUSATO

The fireplace is typically the focal point of the room. For this reason, we tend to give special attention to fireplace surrounds. These trim details historically have embodied and supported the architectural style of the house, from a few simple trim pieces added to Georgian paneling to the ornate, sculpted marble surrounds of Victorian and Italianate homes.

Today's homes are less tied to traditional styles, but designers still look to historic precedent for design guidance. The details go wrong when profiles and moldings are assembled without reference to these practical foundations. While there are many variations and styles to work with, the surrounds illustrated here primarily reflect Georgian and Federal details.

Marianne Cusato is the author of *Get Your House Right: Architectural Elements to Use and Avoid*. Drawings by the author.



Entablature = Architrave, Frieze, and Cornice

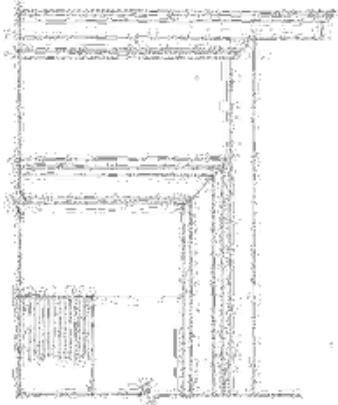
Traditional fireplace surrounds are derived from the orders of classical architecture with pilasters supporting an entablature, which includes the architrave, frieze, and cornice. Though the entablature is often stylized, these three parts are typically distinguishable. For example, you may elongate the frieze and extend the cornice projection, while minimizing the architrave and cornice height. No matter how you adjust the entablature, though, make sure that the frieze either aligns with or is inset from the edge of the architrave, pilaster, or casing below.

Four Surrounds You Can Build

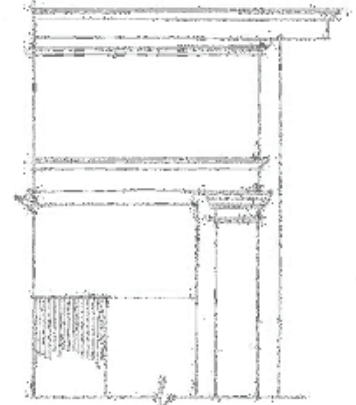
These designs are intended to illustrate not only the range of independent design options, but also the plug-and-play aspect of fireplace-surround composition.



1 One of the simplest design options for a surround is to wrap a door casing around the firebox opening to form the architrave. Then use a 1x board for the frieze with a simple cornice for the mantel shelf.



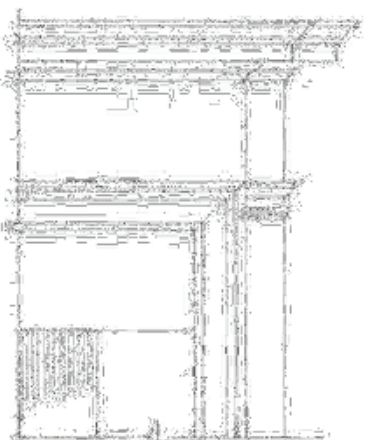
2 The next level of complexity is a design based on Doric or Tuscan orders. A taller mantel shelf and smaller architrave are used to elongate the frieze and lighten the proportions.



3 This surround is more stylized and pulls away from the strict orders by merging the architrave with the pilaster cap. This design also illustrates the potential ornamentation on the pilaster cap and frieze.



4 This design incorporates elements from each of the other options. The wrapped casing from option 1, pilasters from option 2, and center piece from option 3 combine to create a more complex composition.



Noncombustible Clearances

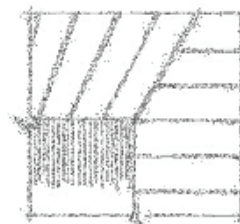
Most codes require a minimum of 6 in. of clearance around the firebox and a lintel of noncombustible material. Codes also limit the projection of the combustible material within a certain distance of the firebox, commonly a 1½-in.-maximum projection within 12 in. of the opening. Start with 8 in. of clearance around the firebox and you can create better shadowlines with a little more projection. The decision for how to finish the clearance-zone area often comes down to a preference in style.

BRICK RUNNING BOND

The most affordable option is to use brick in a running-bond pattern. While not structurally correct without a lintel, this design is common in many homes.

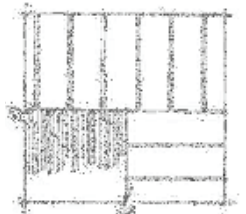


BRICK ARCH When using brick, the ideal detail is to span the opening with a self-supporting brick arch. This is more expensive and requires more skill to install.



BRICK SOLDIER COURSE

To give a more structural appearance to the brick, span the opening with a soldier course. This takes more time to install, but is still an affordable option.



SLATE SLIPS The most refined look is to use black-slate slips around the firebox. While the install is simply three pieces of slate assembled with butt joints, the material is expensive.



Cutting and joining plastic pipe

Plastic pipe, whether PVC or ABS, is the go-to DWV (drain-waste-vent) option in most houses today, replacing cast iron in all but high-end construction. There are good reasons for the popularity of plastic DWV pipe: It's relatively cheap, it's light, and its smooth interior isn't prone to clogging. The only common complaint is that it can be noisy in comparison to cast iron. While I personally like the sound of functioning drain lines (it beats the silence of nonfunctioning ones), some people don't like to be reminded that their house has indoor plumbing. But this is easy enough to deal with in the design stage, if you remember to include plumbing chases that are large enough to stuff with sound-absorbing mineral wool.

Both PVC (which is white in color) and ABS (black) pipes are code approved. The choice between them is generally a regional preference. Where I worked as a builder in New Jersey, PVC was used in most houses. Two hundred yards across the Delaware River in Pennsylvania, all the plumbers used ABS. The main difference in working with the two used to come down to the fact that ABS doesn't require a primer before gluing. In fact, although the use of a primer on all PVC used to be a code requirement (primer is dyed purple so that inspectors can see it's been used), that's no longer the case for pipe less than 6 in. in diameter. Primer is still a good idea, though—remember that building codes simply define the worst job you can legally do.

While plastic pipe is so easy to work with that it's often slapped together without much thought, there's more to it than meets the eye. One of the main steps that's often ignored is beveling the ends of the pipe inside and out. The inside bevel eliminates

STEP BY STEP



1 Find the fitting depth. Measure to the ridge inside the fitting to find how much pipe to allow for the joint.



2 Cut the pipe. A miter saw with a regular blade does a good job making clean, square cuts.



3 Make your marks. When joining fittings such as elbows or tees in a place where orientation matters, dry-fit the parts and make alignment marks on the pipe and the fitting.



4 Bevel the outside. Use the flat side of a mill bastard file to create a 45° chamfer on the pipe's end.



5 Bevel the inside. With the round side of the file, chamfer the inside of the pipe.



To see a step-by-step video on cutting and joining plastic pipe, visit FineHomebuilding.com/magazine.

#KeepCraftAlive

**Buy a Shirt,
Support
the Craft**



**#Keep
CraftAlive**

TauntonStore.com/KCA

OFFICIAL PARTNERS  **CertainTeed**
SABE-GOSMAN

 **SupplyHouse.com**

**YOU FOCUS
ON YOUR ART.**
WE'LL TAKE CARE OF THE REST!

PLUMBING, HEATING & HVAC SUPPLIES

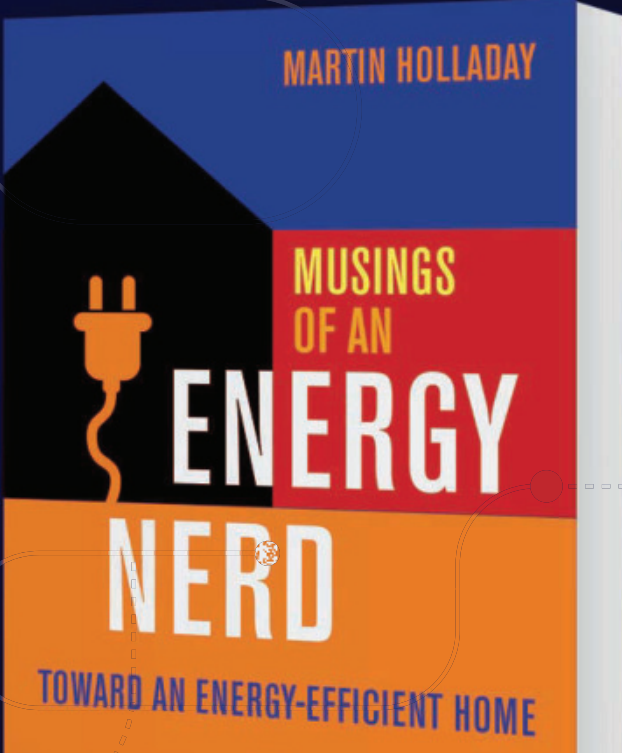
- Fast Shipping
- Huge Inventory
- Low Prices



Installation by
Michael from MA

  **SEND US THE WORK YOU'RE MOST PROUD OF!**
Post your photos with #SupplyHouseArt to be featured.

888.757.4774



**Energy Smart
Insight You
Can Build On**

Fifty of the most popular postings from Martin Holladay's blog give readers a unique view on living a more energy-efficient life.

"Everyone should be reading Martin Holladay's pieces on GreenBuildingAdvisor.com. He is basically a national treasure."

- David Meiland, Owner of Bailer Hill Construction in Friday Harbor, WA

Order today at: Tauntonstore.com/nerd

© 2017 The Taunton Press

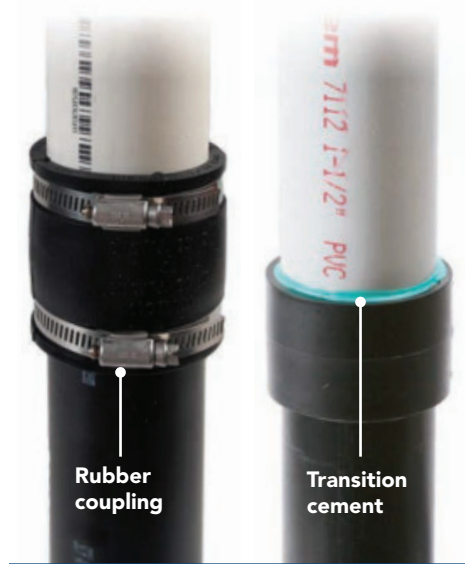
sharp edges that could snag debris and cause clogs. Beveling the outside is important to streamline assembly and ensure leak-free joints.

Plastic pipe joints are solvent-welded; that is, the joining surfaces are coated with a solvent that temporarily softens the plastic while the connection is being made. When the solvent evaporates, the fitting and pipe are permanently bonded. If you don't bevel the outside of the pipe, a slight misalignment between the pipe and fitting can cause the 90° edge of the pipe to dig into the softened interior of the fitting and prevent the pipe from being fully seated in the fitting. Another issue that can arise is the edge of the pipe wiping the glue from the inside of the fitting as it's pushed in, preventing a good joint. Beveling the outside of the pipe prevents this problem as well.

Andy Engel is a former editor and frequent contributor to Fine Homebuilding. Photos by Rodney Diaz, except where noted.

Joining ABS to PVC

The two types of plastic require different types of glue. If you're in a situation where you have to graft one type to the other, you can use a rubber coupling or, if your local codes allow it, a special green-colored transition cement.



STEP BY STEP



6 Prime PVC. If using PVC, apply primer to the inside of the fitting, and then to the outside of the pipe slightly farther than the depth of the fitting. Add a second coat to the inside of the fitting.

7 Cement the pipe. While the primer is wet, apply cement liberally to the outside of the pipe.



8 Cement the fitting. Without rewetting the applicator, apply a light coat of cement inside the fitting, then apply a second coat of cement to the outside of the pipe.

9 Put it together. Join the pieces as quickly as possible, using a quarter-turn motion to seat the pipe in the fitting and align any marks. Hold the parts together for 30 seconds.

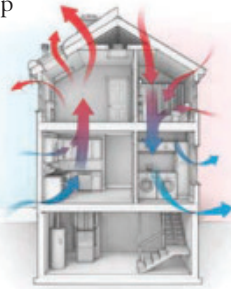


PRODUCT SHOWCASE

Green Building Advisor

Get the building science and energy efficiency information you can trust when you sign up for emails from Green Building Advisor.

Sign up today.



www.GreenBuildingAdvisor.com/newsletter

Coppa Woodworking, Inc.

Manufacturers of Custom Wood Screen Doors, Storm Doors and Much More!



310-548-4142

www.coppawoodworking.com

Cedar Shingles & Cedar Panels

Save Up to 50% on Factory Finished Cedar Shingles and Cedar Panels. Pre-Finished with the Finest Coatings to Provide

Longevity, Long Lasting Beauty, and Instant Curb Appeal. 100s of Finishes Available. Custom Color Matching Available.



1.800.269.0598

www.cedarshinglesdirect.com

FineHomebuilding SHOWCASE

Advertise your business or product

Get your message in front of America's top building industry professionals.

800-309-8953

finehomebuildingmediakit.com



TOOL TECH

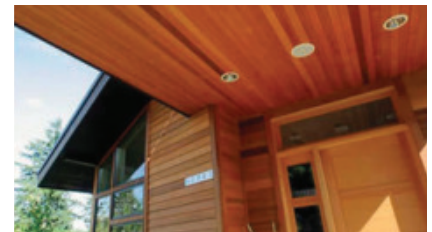
powered by FineHomebuilding

Expert tool reviews you can trust.

Exclusively for
FineHomebuilding.com Members.

FineHomebuilding.com/4Join

Bear Creek Lumber



Supplying the finest quality lumber materials since 1977. We offer top of the line Western Red Cedar, Alaskan Yellow Cedar, Douglas Fir, Port Orford Cedar, Hemlock, Pine, Spruce and Ipe.

800-597-7191

www.bearcreeklumber.com

INDEX TO ADVERTISERS

ADVERTISER	WEBSITE	PAGE	ADVERTISER	WEBSITE	PAGE
Abatron	www.abatron.com	p. 13	HomeGauge	homegauge.com	p. 17
Advantage Lumber	advantagelumber.com	p. 29	Integrity Windows		p. 7
AdvanTech Subfloor Adhesive	advantechsfa.com	p. 5	ProHOME by Fine Homebuilding	finehomebuilding.com/prohome	p. 16
Atlas Survival Shelters	iwanthatshelter.com	p. 27	Protective Products	protectiveproducts.com	p. 99
Bear Creek Lumber	www.bearcreeklumber.com	p. 97	RHH Foam Systems	www.rhhfoamsystems.com	p. 91
Benjamin Obdyke		p. 21	Reggio Register	reggioregister.com	p. 89
CabParts, Inc.	cabparts.com	p. 23	Schluter	www.schluter.com	p. 30
Calculated Industries	www.calculated.com	p. 89	Simpson Strong-Tie	go.strongtie.com/outdooraccents	p. 11
Camo Deck Fastening System	camofasteners.com	p. 100	Softplan	www.softplan.com	p. 17
Cedar Shingles Direct	www.cedarshinglesdirect.com	p. 97	Superior Clay Corporation	www.superiorclay.com	p. 91
Chief Architect	chiefarchitect.com/freetrial	p. 2-3	SupplyHouse.com	supplyhouse.com	p. 95
Coppa Woodworking	www.coppawoodworking.com	p. 97	Teixeira Soapstone	soapstones.com	p. 15
Cor-A-Vent, Inc.	www.cor-a-vent.com	p. 23	Timberwolf Tools	timberwolftools.com	p. 87
Cor-A-Vent, Inc.	www.cor-a-vent.com	p. 89	Titebond	titebond.com/nodrool	p. 25
Crown Point Cabinetry	www.crown-point.com	p. 19	Why I Build from Fine Homebuilding	finehomebuilding.com/whyibuild	p. 22
Dryer Box	www.dryerbox.com	p. 15	ZIP System	ziprevolution.com	p. 85
Dryer Wall Vent	www.dryerwallvent.com	p. 87	ZipWall	zipwall.com	p. 28
Fiba Fuse	www.fibafuse.com	p. 31			
Grayne	grayne.com	p. 9			
Grex Power Tools	www.grextools.com/pinners	p. 27			

Ben Brunick spent the last four years in a state mental hospital—not as a patient, but as a woodworker, restoring windows. Nearly 200 windows, in fact. Enough to drive anybody a little crazy. Not Brunick, though—he just feels lucky.

"I live in a small town in South Dakota. I'm in flyover country. To land a job like this, in my hometown, that's interesting, that's technically challenging ... it's a fantastic gig."

After restoring antique pool tables in Lincoln, Nebraska, for 10 years, Brunick moved his family back to Yankton, South Dakota, and started Chalkstone Woodworking. That's when the Historical Society approached him for help restoring the Mead Building. Built in 1909 as part of the State Hospital for the Insane, it's slated to be the new home of the Dakota Territorial Museum.

When Brunick first visited the building, all he could see were the huge arched windows out front. "I want to do those," he said to himself. "I don't know how I'm going to do it, but I know I can." And so he has.

Besides fabricating all the sashes, Brunick had to scribe the arched storm windows to fit asymmetrical openings in the brick. On the inside, he then had to fit the double-hung sashes, with matching arches, so that the radiating muntins all line up.

Milling and scribing those arches, he says, was "walking on the edge of catastrophe. I thought, 'Man, if I cut this wrong, I'm pickled.'" But he's quick to add, "That's when it's the most fun. You lose track of time. You lose track of everything. You get lost in it."

— Kevin Ireton, editor at large



"If you can make a board flat, straight, and square, you can do just about anything."

BEN BRUNICK
WOODWORKER
YANKTON, S.D.



Keep Craft Alive is our campaign celebrating those who have chosen to passionately pursue a career in design, building, and remodeling. Find out more and show your support by visiting KeepCraftAlive.org, and use #KeepCraftAlive to share your passion for the cause.



Cut cleanup time, increase
customer satisfaction – and
referrals – by using **Surface
Protection and Dust Control**
delivered with **Exceptional
Customer Service.**

That's Protective Products.



Visit us at: **ProtectiveProducts.com**

Call: **(800) 789-6633**

CAMO[®]

DECK FASTENING SYSTEM



HOW IT WORKS



**WHY PUT SCREWS
ON THE TOP OF
YOUR DECK WHEN
YOU CAN HIDE THEM
ON THE EDGE?**

Visit camofasteners.com

