April 2023 $4.95

JLC

THE JOURNAL OF LIGHT CONSTRUCTION

Repairing Termite Damage

Untangling the Skilled Labor Knot

CAD for Carpenters

jlconline.com

Chief Architect – 30 second rendering.
See more of this model online.

Download a Free Trial

Residential Design

Remodeling & Cost Estimating

Kitchen, Bath, & Interior Design

3D Design, Floor Plans, Elevations

Construction Drawings

CAD Tools & Section Details

Mac

Windows

Chief Architect®

Smarter Design Software

FASTER WOODWORK.
BETTER BUILDS.
ULTRAPRO™.

WWW.GRABBERPRO.COM

A solid build starts with solid materials. Materials that let you work faster and build better – like Grabber UltraPro ™ wood screws. Each screw is outfitted with a trademarked LOX® Recess precision fit to ensure faster drives with no cam-outs. Two sets of thread ensure a tighter bond and an extra-sharp point eliminates the need for pre-drilling. A patented spiral head self-countersinks and you'll find you can drill one-handed and off-angle more easily than ever. There's an UltraPro option in any size you need, indoor or outdoor. You deserve UltraPro in your next project. You'll notice your drill times drop and your build quality improve.

Contact your local Grabber dealer or visit GrabberPro.com/UltraPro to get started.

GRABBER CONSTRUCTION PRODUCTS
"The Professional's Choice"™

JLCONLINE.COM

Contents

On the cover: Matt Troy and Ernesto Sanchez remove a termite-damaged window and wall framing from a home in Bowie, Md. See the story on page 29. Photo by Robert Mignogna.

FEATURES

DEPARTMENTS

THE JOURNAL OF LIGHT CONSTRUCTION (ISSN 1056-828X), Volume 40, Number 4, is published monthly except combined issues in Jan/Feb, July/Aug, Sept/Oct and Nov/Dec by Zonda Media, 1152 15th St. NW, Suite 850, Washington, DC 20005. Annual subscription rate for qualified readers in the construction trades: $39.95; nonqualified annual subscription rate: $59.95. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues. Publisher reserves the right to determine recipient qualification. Canada Post Registration #40612608/G.S.T. number: R-120931738. Canadian return address: IMEX, PO Box 25542, London, ON N6C 6B2. Periodicals postage paid at Washington, DC, and at additional mailing offices. POSTMASTER: Send address changes to JLC, Box 3530 Northbrook IL 60065-3530.

Building the future of housing.

JLC

JLCONLINE.COM

Clayton DeKorne, Chief Editor, JLC Group, cdekorne@zondahome.com
Andrew Wormer, Executive Editor, JLC Group, awormer@zondahome.com
Laurie Elden, Managing Editor, lelden@zondahome.com
Tim Healey, Senior Editor, thealey@zondahome.com
Vincent Salandro, Associate Editor, Products, vsalandro@zondahome.com

Carolyn Sewell, Design Director, csewell@zondahome.com
Melissa Krochmal, Graphic Designer, mkrochmal@zondahome.com

Contributing Editors: Jake Bruton, Mark Clement, Rob Corbo, Ted Cushman, Dave Holbrook, Doug Horgan, Jake Lewandowski, Roe Osborn, Emanuel Silva, Gary Striegler, Tim Uhler

Cathy Underwood, Senior Director, Print Production
Margaret M. Coulter, Senior Director, Print Production
Stephanie Fischer, Production Manager, Inside Sales
Andrea Leonard, Media Operations Specialist
Christina Lustan, Group Director, Audience Marketing & Circulation

PUBLISHED BY ZONDA MEDIA

Jeff Meyers, Chief Executive Officer
Melissa Billiter, Chief Financial Officer
Andrew Reid, Chief Operating Officer
Amy Dudley, Chief Sales Officer
Jennifer Pearce, Executive V.P., Chief Content Officer
Jennifer Malkasian, V.P., Audience Development and Analytics
Kurt Nelson, Group V.P., Talent Strategy
Tim Sullivan, Senior Managing Principal, Advisory Group

JLC will occasionally write about companies in which its parent organization, Zonda Media, has an investment interest. When it does, the magazine will fully disclose that relationship.

EDITORIAL AND ADVERTISING OFFICES

1152 15th St. NW, Suite 850
Washington, DC 20005
202.452.0800

JLC welcomes letters and article submissions from our readers at **jlc-editorial@zondahome.com**. Keep copies of all original materials.

SUBSCRIPTION SERVICES

Online: jlconline.com/cs
Email: jlc@omeda.com
Phone: 888.269.8410
Mail: JLC, PO Box 3530
Northbrook IL 60065-3530

You can subscribe online at jlconline.com/subscribe.
Subscription rates for qualified readers: 1 year/ $39.95; 2 years/$64.95. Canada, International: add $15/ year for surface delivery. Sales tax added if required by your state law. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues.

JLC BACK ISSUES

JLC subscribers have free access to every issue of **JLC** since 1986. Enable access at jlconline.com/register.
Back issues: $4.95 each, plus $5 shipping per order. Call 888.269.8410 for availability.

ARTICLE REPRINTS

Wright's Media
877.652.5295, zonda@wrightsmedia.com

JLC UPDATE EMAIL NEWSLETTER

JLC Update is free to **JLC** readers. Each issue contains industry news and tips on building materials, techniques, tools, and technology. Subscribe online at jlcupdate.jlconline.com.

LIST RENTALS

The Information Refinery, Brian Clotworthy
800.529.9020, brian@inforefinery.com

Privacy of mailing list: We rent our subscriber list to reputable companies. If you do not wish to receive promotional materials from other companies, please call us, toll-free, at 888.269.8410.

ADVERTISING SALES

Paul Tourbaf, Executive Vice President
847.778.9863, ptourbaf@zondahome.com

John Tatusko, Vice President
617.359.8619, jtatusko@zondahome.com

Ryan Sneltzer, Director, Strategic Accounts
330.904.6177, rsneltzer@zondahome.com

Steve Van Kirk, Director, Strategic Accounts
480.277.5422, svankirk@zondahome.com

Cathy Whelan, Director, Strategic Accounts
708.466.6083, cwhelan@zondahome.com

Patrick Zazzara, Director, Strategic Accounts
571.488.5324, pzazzara@zondahome.com

Katina Billado, Director, Media Relations
kbillado@zondahome.com

Zonda™
Building the future of housing.


LEAK-FREE GUARANTEE*
STICK IT TO THE RAIN.
ZIPsystem™
ROOF ASSEMBLY
Don't let the threat of leaks keep you up at night. Stick it to the rain with our new ZIP System™ waterproofing peel and stick roofing underlayment. Add it to ZIP System® sheathing and tape and get protection so strong, we'll back it with a Leak-Free Guarantee*.
Find out how to get your next residential project covered at LeakFreeGuarantee.co.
*Registration Required. Leak-Free Guarantee applies only when using a ZIP System™ Roof Assembly. See LeakFreeGuarantee.co for details and the definition of a ZIP System Roof Assembly.
© 2022 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 25129 3/22.

"Ecoview supports its network of dealerships with an unsurpassed lead generation program, expert sales training, homeowner financing, installation training, a nationally recognized brand, exclusive territory, and much more. Almost anyone can learn our proven system. We will show you how you can start with a reasonably small investment to grow your business to any size you desire."

NOW IS THE TIME TO START YOUR OWN ECOVIEW WINDOWS BUSINESS

BENEFITS INCLUDE:

- Outstanding Retail Presence
- Expert Sales Training
- Professional Web Presence
- Deeply Discounted Factory Direct Pricing
- Zero Franchise or Royalty Fees
- Nationally Recognized Company
- World-class Homeowner Financing
- Ongoing Training & Support
- Business Management Software
- National Healthcare Program with BCBS
- Plus Much More!

EcoView WINDOWS & DOORS

To find out if your market is still available call 1.855.621.1616 or visit ecoviewwindows.com and select "Become a Dealer"

BY JLC STAFF

Key Trends in the 2023 Cost vs. Value Report

Zonda Media recently released the 36th annual Cost vs. Value (CVV) report detailing the home renovations that deliver the best return on investment (disclosure: Zonda Media owns *JLC*). True to form, this year's report confirms a consistent truth that has been revealed on every report for the last 30 years: Exterior replacement projects typically provide a higher return on investment than interior discretionary remodels at the time of house sale.

The value figures are derived from a survey of more than 6,000 Realtors. The survey supplies them with project specifications and cost estimates, along with photos and illustrations describing the projects, and asks for each remodeling project: "What value does this project add to the sale price of a home?"

The reason for high returns on exterior projects stems from what real-estate professionals regularly witness from buyers: If their first impression is a run-down exterior, they tend to enter the property wary and reluctant to spend large on the property. If, on the other hand, the home looks well taken care of, they enter with a more positive view from the outset.

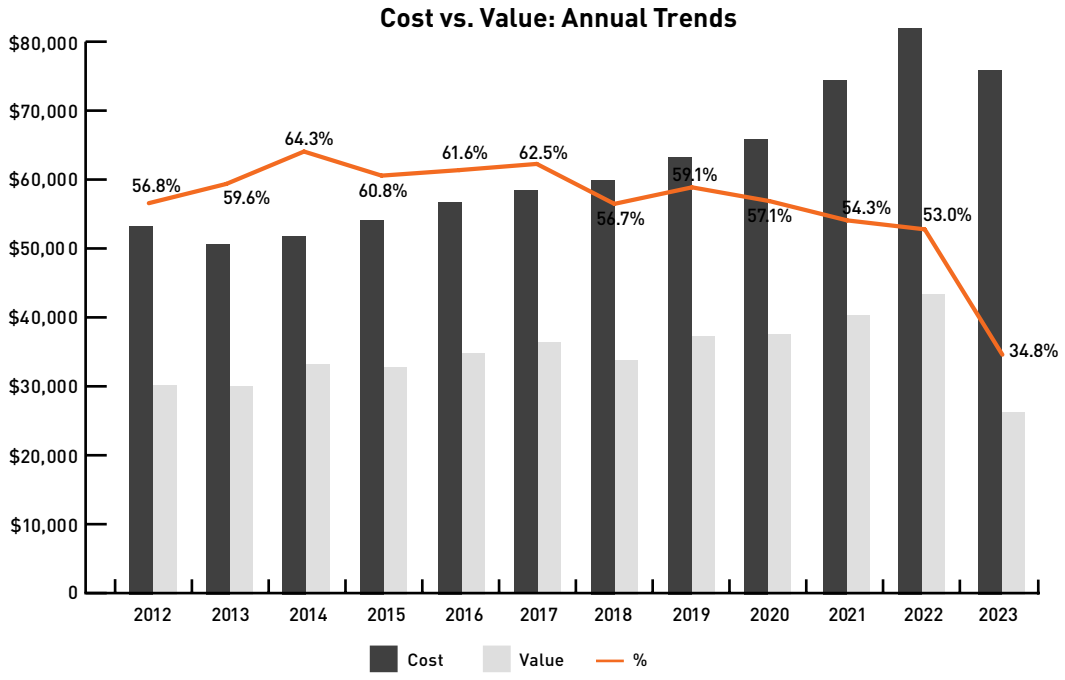
This year, there are two exceptions to the rule that exterior projects rate higher: a minor kitchen remodel and a midrange bath remodel. The report suggests the average seller can expect an 86% return on a light touch to the kitchen, and 67% on a modest bathroom reno. Here, too, the rationale stems from how buyers are likely to feel, especially in today's tight economy. Buyers are hyper-focused on hanging onto extra cash right now, especially if buying a house has put a big dent in their savings. They want workable kitchens and baths and don't necessarily want to take on an interior remodel before they move in.

Larger discretionary projects, such as upscale kitchen, bath, and primary-suite remodels, don't influence the value of the home nearly as much. That's because a "dream kitchen" or "luxury bath" conceived by a former owner may not include the finishes and selections that all buyers will value highly. There are vast differences in aesthetic tastes; one person's elegant new kitchen or bath will not be viewed by all prospective buyers equally. These discretionary projects *do* have great value for the owners who make the selections, reflecting a different kind of value—the satisfaction in living in their dream home. This underscores an important point: The CVV report is specifically about establishing just one type of value—the dollar value at the time of sale. Remodelers often describe using the CVV report to open a discussion about budget for proposed projects.

Cost vs. Value: National Averages

Project	2023 National Averages		
	Job Cost	Value at Sale	% Cost Recovered
HVAC Conversion (Electrification)	$ 17,747	$ 18,366	103.5%
Garage Door Replacement	$ 4,302	$ 4,418	102.7%
Manufactured Stone Veneer	$ 10,925	$ 11,177	102.3%
Entry Door Replacement	$ 2,214	$ 2,235	100.9%
Siding Replacement (Vinyl)	$ 16,348	$ 15,485	94.7%
Siding Replacement (Fiber Cement)	$ 19,361	$ 17,129	88.5%
Minor Kitchen Remodel	$ 26,790	$ 22,963	85.7%
Window Replacement (Vinyl)	$ 20,091	$ 13,766	68.5%
Bathroom Remodel (Midrange)	$ 24,606	$ 16,413	66.7%
Window Replacement (Wood)	$ 24,376	$ 14,912	61.2%
Roofing Replacement (Asphalt Shingle)	$ 29,136	$ 17,807	61.1%
Grand Entrance (Fiberglass)	$ 10,823	$ 5,457	50.4%
Deck Addition (Wood)	$ 17,051	$ 8,553	50.2%
Roofing Replacement (Metal)	$ 47,414	$ 23,163	48.9%
Universal Design Bathroom	$ 39,710	$ 18,270	46.0%
Major Kitchen Remodel (Midrange)	$ 77,939	$ 32,574	41.8%
Deck Addition (Composite)	$ 23,430	$ 9,325	39.8%
Bathroom Remodel (Upscale)	$ 76,827	$ 28,203	36.7%
Major Kitchen Remodel (Upscale)	$ 154,483	$ 48,913	31.7%
Bathroom Addition (Midrange)	$ 57,090	$ 17,237	30.2%
Primary Suite Addition (Midrange)	$ 157,855	$ 47,343	30.0%
Bathroom Addition (Upscale)	$ 104,733	$ 27,830	26.6%
Primary Suite Addition (Upscale)	$ 325,504	$ 73,875	22.7%

National perspective. Sorted by the highest return on investment, this table ranks all 23 projects in the 2023 Cost vs. Value report.



Historical perspective. This chart shows trends based on 15 projects that have always been included in the report. This year, both costs and values fell for the first time since 2012, with the average project value falling sharply to its lowest level since the report began. This grim outlook likely arose from falling home prices and rising mortgage rates faced by Realtors in Q4 2022 when they were surveyed.

It can be reassuring to many prospective clients to know what a project might return if they *must* sell their property. Once the investment has been established, remodelers report having an easier time talking about other values a proposed project might have for clients.

THE HOTTEST TREND

New for 2023 is the HVAC conversion project. This project details removing an oil or gas furnace and replacing it with an electric heat pump that is appropriate for the climate zone. The CVV report shows that not only is this a popular project, but it also offers an exceptionally high return on investment (104%).

The trend toward home electrification has been gaining momentum in recent years. According to recent Energy Information Administration (EIA) data, electricity has surpassed natural gas as the largest residential energy source, with space conditioning accounting for the highest proportion of home energy use.

The EIA also reports that a growing proportion of the electricity generated in the U.S. is coming from renewable sources. Expanding this proportion while reducing fossil fuel emissions is viewed as a viable solution to reducing greenhouse gas emissions and alleviating climate change. However, climate warming is not the only issue driving the push toward electrification. Energy independence, which the war in Ukraine has brought into sharp focus, is also a growing concern for which electrification offers a solution.

Independent from global problems, heat pumps have grown in popularity because they provide both heating and cooling. The conversion from a furnace or boiler to a heat pump provides the added value of summertime cooling without a separate air conditioner. New inverter technology has also made heat pumps viable for heating in northern states, erasing the discomfort problems that previously plagued their use in cold climates.

A ROILING ECONOMY

The most noticeable trend in the 2023 CVV report has been the plunge in the overall ROI numbers. While the projects with the highest returns have edged over 100%, those at the lower end of the ROI range have dropped well below 50%, with the overall cost-value ratio down to 34.8%, the lowest in the history of the report. The previous low for the CVV (a ratio of value over cost) was 56.8% in 2011–12, on the heels of the Great Recession.

Todd Tomalak, who leads Zonda's Building Product Research and Advisory Practice, reminds us that, for the 2023 CVV report, Realtors were surveyed in Q4 2022 at what was unquestionably the nadir of the real estate market. Mortgage rates were rising while

Cost vs. Value by Region

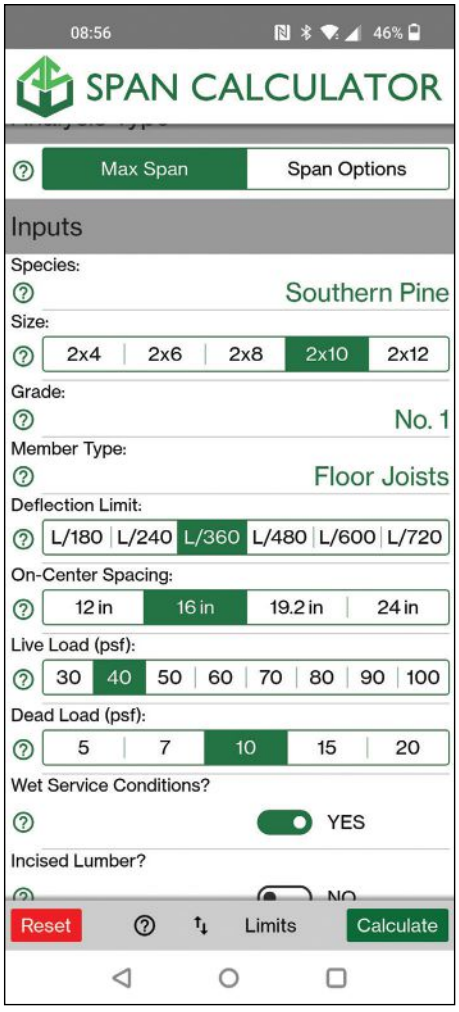
	Middle Atlantic	New England	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific
HVAC Conversion (Electrification)	95%	113%	87%	98%	94%	92%	103%	115%	105%
Garage Door Replacement	104%	83%	99%	80%	78%	93%	85%	100%	97%
Manufactured Stone Veneer	103%	95%	109%	103%	90%	102%	102%	97%	85%
Entry Door Replacement (Steel)	44%	39%	53%	41%	37%	59%	48%	66%	89%
Siding Replacement (Vinyl)	98%	89%	99%	73%	90%	98%	98%	93%	98%
Siding Replacement (Fiber Cement)	73%	101%	96%	67%	75%	107%	98%	107%	87%
Minor Kitchen Remodel	75%	84%	79%	74%	84%	79%	80%	90%	79%
Window Replacement (Vinyl)	66%	72%	72%	57%	70%	65%	72%	73%	68%
Bathroom Remodel (Midrange)	58%	58%	64%	64%	59%	64%	68%	60%	63%
Window Replacement (Wood)	57%	67%	61%	56%	62%	55%	61%	69%	58%
Roofing Replacement (Asphalt Shingle)	53%	60%	64%	50%	51%	67%	59%	53%	61%
Grand Entrance (Fiberglass)	51%	47%	54%	40%	40%	47%	45%	46%	50%
Deck Addition (Wood)	44%	52%	46%	35%	48%	44%	49%	51%	52%
Roofing Replacement (Metal)	42%	47%	51%	43%	42%	48%	50%	42%	43%
Universal Design Bathroom	42%	44%	44%	43%	41%	45%	43%	41%	43%
Major Kitchen Remodel (Midrange)	38%	42%	40%	36%	40%	37%	38%	44%	39%
Deck Addition (Composite)	43%	37%	39%	32%	38%	33%	37%	39%	37%
Bathroom Remodel (Upscale)	32%	38%	35%	36%	31%	35%	35%	35%	33%
Major Kitchen Remodel (Upscale)	30%	30%	30%	28%	30%	29%	28%	32%	28%
Bathroom Addition (Midrange)	26%	30%	28%	29%	28%	32%	29%	35%	30%
Primary Suite Addition (Midrange)	27%	28%	29%	30%	26%	28%	28%	32%	27%
Bathroom Addition (Upscale)	24%	25%	24%	26%	23%	26%	27%	28%	25%
Primary Suite Addition (Upscale)	20%	21%	21%	23%	20%	21%	22%	25%	20%

Regional perspective. A look at the regional averages (sorted to match the "National Averages" table on page 7 for highest ROI) shows the influence of local market variations. The table reveals some wide market fluctuations, likely driven by a combination of resolving supply chain backlogs plus housing markets cooling at very different rates.

inflation was surging, and real estate sales were falling. "It was the darkest hour of 2022 and for real estate in a decade," Tomalak explains. "But it provides an important perspective to capture. We learn what projects maintain a premium to homebuyers when times are tough, and they can't afford everything on their wish list."

The chart above showing regional variations reveals wide differences in cost and value (one startling example is the entry door replacement project). Tomalak believes these fluctuations are likely driven by a combination of resolving supply-chain backlogs plus housing markets cooling at very different rates—a sign of a turning market where not all the markets are at the same stage. "We have seen this sort of pricing data emerge several other times; it is usually a phenomenon that occurs in 'inflection' points around business cycles (in this case, the housing cycle)," Tomalak explains. "The volatility that we are seeing in building product costs (and housing) since 2020 had more outliers in price/cost data than any time over the last 70 prior years cumulatively." Tomalak says this has occurred at other times when there were severe whipsaws and product shortages (he cites WWII, the 1910s, and the 1920s as examples). These were markets where the fundamentals of supply and demand were distorted in some major way, and thereby the range and volatility of pricing were markedly inconsistent, Tomalak says.

Q Will "up-sizing" deck joists so that they exceed code requirements result in a safer or stiffer deck?



The AWC's Span Options Calculator for Wood Joists and Rafters (awc.org) can be used to determine joist and rafter spans for most species and grades of softwood and hardwood lumber under different loading conditions. The free app (shown here on an Android phone) is also available in a web-based browser version for desktop.

A *Mike Guertin, a builder and remodeler in East Greenwich, R.I., and frequent presenter at DeckExpo and JLC Live, responds:* Some deck builders oversize their deck framing by sizing joists greater than code requires or limiting their joist and cantilever spans to less than code allows. A common reason they cite for exceeding the code is that the joist tables are a "minimum standard," and they're concerned about the deck feeling bouncy. Other deck builders use up-sizing the framing members as part of their marketing and sales effort.

But there is no structural benefit to beefing up the framing for safety or stiffness. The tables in the IRC are conservative, with a substantial safety factor already built in and an L/360 deflection limit. That deflection translates into about 3/8 inch on a 12-foot joist span when a deck is fully loaded at 40-psf live load—something that rarely happens unless you have a heavy snowfall. And the same would be true for higher loads if joists were sized per the new joist sizing tables in the IRC that provide for 50-, 60-, and 70-psf snow loads (see "Right-Sizing Deck Joists," Mar/23).

But even the L/360 limit is a bit conservative, because the IRC tables are based on #2-grade treated lumber, while some lumberyards stock mixed #1- and #2-grade treated lumber and others stock all #1 grade. When you use better than #2-grade lumber, the allowable span based on the American Wood Council's joist sizing tables is greater than the span in the tables published in the IRC. For example, the span difference between #2- and #1-grade 2x8 southern pine treated lumber used for deck joists is 7 inches. So your decks are already stiffer with less deflection when you purchase better-grade treated lumber and size the joists based on the code table. If you want to take advantage of the even greater spans allowed when using #1 treated lumber for deck joists, you can size your joists using the AWC's free joist- and rafter-span calculator (see screenshot, left).

I usually right-size deck joists to the maximum span that can be eked out of the table. I haven't noticed—nor have my clients—any bounciness or excessive deflection. I won't fault any deck builder for building stronger decks, but rather than overbuilding the frame, I like to right-size the footings, beams, and joists, and spend more time and money on safety elements that the building code doesn't have prescriptive requirements for, like guardrails and stairs. And I take steps that make a deck last longer, like treating field cuts with a topical wood preservative (a frequently overlooked code requirement east of the Rockies) and capping joists and beams to help shed water. To me, these measures offer better value to my clients than oversized deck framing, which I think is a waste of money and materials.

Q Is it OK to leave a tool battery—specifically a lithium-ion battery, which I assume is what most tool batteries are these days—on its charger for extended periods of time, even after it is fully charged? (By extended, I mean for a day or a week or even longer.) Does it harm the battery to leave it in a cold truck or shop overnight, or longer?

A *Dave Veprek, vice president of product development at SBD Inc. (DeWalt), responds:* It is OK to leave batteries in DeWalt chargers, because our lithium chargers stop charging once the battery reaches a fully charged state. To the best of my knowledge, this is true industry-wide with lithium-ion batteries and chargers, and not specific to our company.

Generally speaking, Li-ion batteries have a low self-discharge rate of 2% to 3% per month. In comparison, the self-discharge rate for a standard lead-acid battery (the kind that is used in cars) is between 4% and 6% per month; earlier-generation NiCad or NiMH tool batteries were plagued with much higher self-discharge rates—as much as 20% per month for NiCad batteries and 30% per month for NiMH batteries. As a result, the battery chargers used for most modern Li-ion tool batteries don't have a "trickle charge" mode; they just shut off once the battery is charged.

Another advantage of Li-ion batteries over older NiCad or NiMH batteries is that they don't have what is called a battery memory effect, in which the battery "remembers" where it was in the charge/discharge cycle when it was most recently recharged, and tends to return to that point during the next recharge. Because a Li-ion battery doesn't have a memory, you don't have to worry about damaging or shortening the life of a partially discharged battery by throwing it onto a charger at lunchtime. And you don't have to worry about "killing" a DeWalt battery by fully discharging it because our system has a cut-off that stops the tool from damaging the battery. I assume that this is true of the Li-ion batteries of other tool manufacturers, as well.

Cold weather affects how quickly any battery will charge, because it increases the battery's impedance, or internal resistance, so that the battery isn't able to accept the same amount of charging current as it can when it is warmer.

This is especially true of Li-ion batteries that are made with conventional organic carbonate solvents, which are more susceptible to reduced ion mobility than aqueous solvents found in NiCad and lead-acid batteries. This can lead to lithium plating during charging and also sluggish reaction and reduced power output in cold weather. It is a little hard to generalize, though, since there are many types of battery chemistries, though one positive effect is that cold temperatures reduce the self-discharge rate of Li-ion batteries even further, making it actually advisable to store a Li-ion in the cold.

Still, for best performance, it is a good idea to warm up a cold battery before use. In general, our recommendation is to store batteries in a location that is between 32°F and 104°F, and not to store or use the tool and battery pack in locations where the temperature may reach or exceed 104°F (40°C). However, I advise to always check the instruction manual for your batteries.

In this cut-away image of a DeWalt 20-volt lithium-ion battery, the five rectangular silver objects are 4-volt pouch cells that are wired together in series to provide 20 volts of power. The green board is the module that electronically controls the battery.

Photo courtesy DeWalt

ROOF VENTILATION FOR WOOD & METAL APPLICATIONS

CEDAIR-MAT®
Roof Ventilation Mat

Designed for use in **cedar** roof construction.
Manufactured from Nylon 6
200 square feet per roll
Independent lab testing shows 75% better air flow compared to competitive products.

R-VENT®
Roof Ventilation Mat

Designed for use in **metal** roof construction.
Manufactured from Nylon 6
200 square feet per roll
Reduces sound transmission often caused by rainfall or hail.

ADVANCED
Building Products Inc.

AdvancedBuildingProducts.com

A Better Rainscreen for Cedar Shingle Roofs

BY CHRIS YERKES

Most of our work is centered around Cape Cod, but a few years ago (right before the COVID-19 pandemic), we ventured into the Berkshires near Great Barrington, Mass., to install a red-cedar shingle roof on a home that was under construction. Normally, we roll out Cedar Breather woven nylon mesh over the sheathing before nailing down wood shingles to improve ventilation and drying potential underneath the shingles, but for this project, the general contractor had specified a rigid rainscreen product called Ventgrid12. We had never heard of it, but we were game for a challenge. It turned out to be quite simple.

Photos by Chris Yerkes, except 1, courtesy Ventgrid

Ventgrid12 plastic rainscreen panels can be used under siding **(1)** as well as roofing. The roofing crew installed the 4-by-8-foot panels over Grace Ice & Water Shield membrane, which the general contractor had installed **(2)**. Workers used saws and snips to trim panels to fit at hips and around vents **(3, 4)**. The panels are flexible enough to conform to the flared roof deck **(5)**.

The panels could be laid in place as needed as the crew worked their way up the roof, making them easier to work with than a roll of material that has to be installed in long courses **(6)**. The red-cedar hip cap shingles were custom-fabricated off site to match the specific roof pitch where they would be used **(7)**. Because shingles are fully supported by the rigid panels, they won't flex or crack under a worker's feet as they might with a more compressible, fabric-style rainscreen material **(8)**.

Ventgrid12 is a semi-rigid, 1/2-inch-thick (12.7 mm; hence the "12" in the name) 4-by-8-foot panel made from recycled plastic. Designed for interior and exterior use on floors and walls, the 32-square-foot panels have an open grid design that allows for both drainage and ventilation. Weighing only about 8 pounds each, they are easy to handle, and they have an 8,000-psf load capacity—plenty strong for use underneath wood shingles.

Installation. When we arrived on site, the GC had already installed an ice and waterproofing membrane over the Zip-sheathed roof, a belt-and-suspenders approach to account for our unpredictable New England weather and a long construction schedule. To prep the roof deck for the extra 1/2-inch thickness of the panels, his crew had extended the fascia and rake trim by 1/2 inch above the surface of the sheathing, effectively picture-framing the roof deck to conceal the edges of the panels and block insect entry. The manufacturer also offers a screened edge trim—called Ventrim10—that can be used in this application, but we didn't use it on this project.

One of the first things we noticed was how easy the panels were to install. While Cedar Breather isn't particularly difficult to install, rolling out a 200-square-foot roll and tacking it down is really a two-person job. With Ventgrid12, one person can easily lay the panels on the roof deck and tack them in place, driving a few roofing nails along the bottom edge through preformed attachment holes molded into the panels. We oriented the panels horizontally, with subsequent courses held in place by the course below.

This was a fairly complex roof, with flares, hips, dormers, and a number of penetrations for mechanicals and ventilation. But this didn't complicate the installation of the panels as we worked our way up the roof. At the hips, we used a small, battery-powered circular saw to cut the panels to size, fitting them as we went. For curved or more complex cuts around penetrations, we used heavy-duty shears or even a utility knife. And because the panels are fairly flexible, they conformed to the flare along the lower edge of the roof without any difficulty.

Longer fasteners. Normally, we would use 1 1/2- or 1 3/4-inch 304-grade-stainless-steel ring-shank roofing nails to install the pressure-treated Perfection red cedar shakes that we used on this roof. To accommodate the extra thickness of the Ventgrid12 panels, we switched to 2 1/2-inch fasteners to make sure they would penetrate the shakes, the Ventgrid12, and all the way through the sheathing.

For us, one of the biggest benefits of using Ventgrid12 as a roof underlayment is that the wood shingle roof is now walkable without risk of damage to the shingles (Cedar Breather will compress, so shingles are more at risk of cracking if walked on). Not only is this a benefit during installation, but I think that it will make a big difference long-term for any other trade that has to access the roof to replace windows, clean chimneys, and so forth.

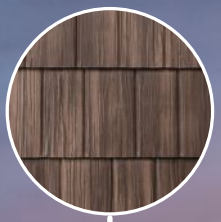
Cost. You need a little more than six Ventgrid12 panels to achieve the same coverage as a 200-square-foot roll of Cedar Breather. While I don't know what the panels cost in 2019 when we worked on this project (since the GC sourced and ordered them), current pricing seems to run between $50 and $55 per sheet, or between $300 and $330 for the same coverage as a roll of Cedar Breather, which costs as little as $120 in our market. For a client who is already paying for a high-end roof, this is an upgrade that is well worth the extra cost because of the improved ventilation underneath the shingles, improved durability, and resulting longer life of the roof.

Chris Yerkes is the owner of Cedarworks (cedarworksonline.com), in Brewster, Mass.

HOME EXTERIOR SOLUTIONS

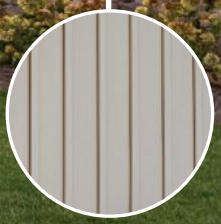
ENDURE™
DOUBLE HUNG WINDOWS
WITH INTERNAL GRIDS

SADDLEWOOD
SHAKE
METAL ROOFING



WOODBRIDGE
NATURAL CUT™
MANUFACTURED STONE

SIGNET® FIBERGLASS
DOOR IN PECAN WITH
PRIVACY GLASS



CEDARMAX®
BOARD 'N BATTEN
IN SANDALWOOD

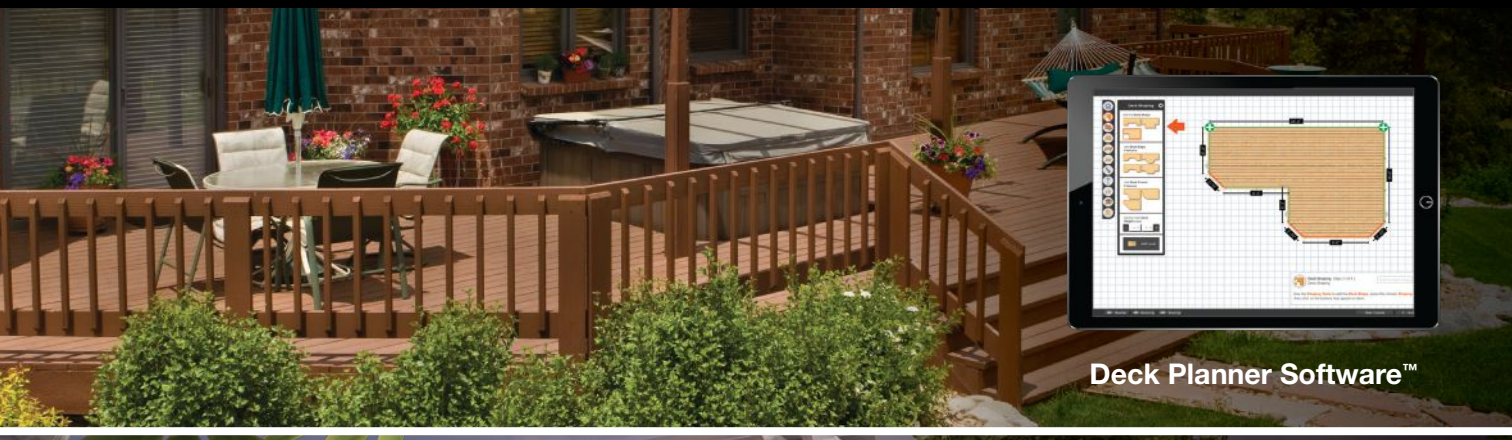
ProVia is your one source for professional-class building products

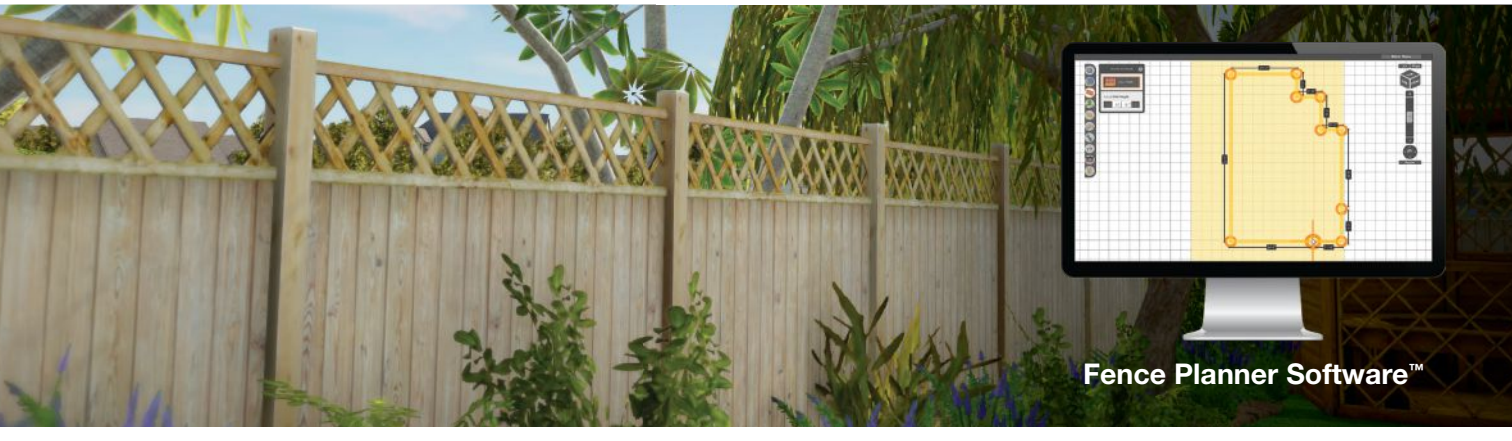
Use the QR code to learn more about our premium building products and why it's great to partner with ProVia.

ProVia®
THE PROFESSIONAL WAY

DOORS | WINDOWS
SIDING | STONE | ROOFING

Build your customer's ultimate backyard dream.





DPS Deck Planner Software™
PPS Pergola Planner Software™
FPS Fence Planner Software™

Plan, quote and build outdoor structures faster and easier. Grow your construction business with free Outdoor Living software from Simpson Strong-Tie. Our design apps include Deck Planner Software™, Pergola Planner Software™ and Fence Planner Software™. The in-app tutorials make it easy to select materials, dimensions, colors and hardware. Add patios, sheds, landscaping or other features, then show customers their entire yard in a realistic 2D or 3D view. Once your design is complete, you can print a full materials list, provide a quote, review permit submittal pages, and select a local dealer with available supplies in your area.

Download free design software at **go.strongtie.com/outdoorliving**. Or call (800) 999-5099 to learn more.

SIMPSON Strong-Tie®

Custom Garage Doors Built to Last

BY DALE DIAMOND

Last fall, the owners of a home my company was renovating asked if we could repair the garage doors on a detached guest house and garage adjacent to the residence. I inspected the two sets of outswing wood doors and found they were hard to operate, the headers in both openings had sagged, and the jambs had rotted at the bottoms. Determining they were beyond repair, I recommended reframing the two door openings and installing replacement doors. The clients agreed, but noted they liked the hinged doors and wanted them replaced in kind.

A few weeks earlier, we had rebuilt the clients' front entry porch using sapele—a highly rot-resistant tropical hardwood—to recreate its intricate Gothic-style trim work. The homeowners were happy with the look of the new porch, so we suggested we make the new doors from the same, long-lasting material. They liked the idea and gave us the go-ahead to build them out of the exotic, premium wood.

I've built numerous custom doors on site over the past decade using a Festool Domino XL hand-held joiner and other tools, such as a router and contractor's table saw, commonly found on any jobsite. Most of the doors have been 1 3/4 inches thick with panels set in grooves routed into the stiles and rails, although I've made a few with the panels held in place with applied bead moldings. (See "Building Custom Doors on Site," Sep/16, for more information).

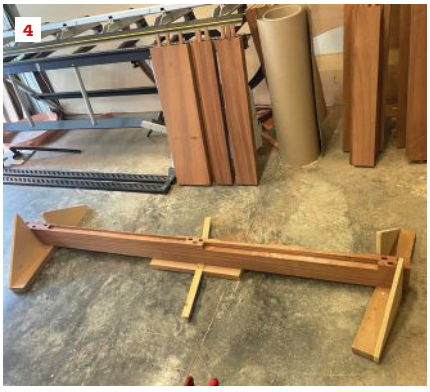
The process is pretty straightforward. Making the door frame, I position the stiles and rails on a worktable and mark lines with a framing square crossing both pieces; these serve as my alignment points for the domino cutter. I line up the center of the hand-held joiner with the alignment points, then cut the oval mortises needed to fit the domino tenons. I take the time to accurately align and cut the mortises, which eases the door assembly later on.

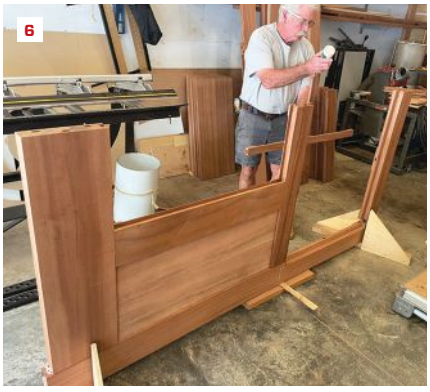
For the door panels, I cut the stock to size, lay up the pieces side by side, then mark a line across them. I center the joiner to the lines, cut the mortises, then glue up and domino the pieces together. To accommodate any movement, I build the finished panels so that they are slightly undersized. I then use a router set up with a double fence to make grooves in the stiles and rails to receive the door panels **(1)**. Finishing up, I glue and tenon the assembly together on a worktable, using pipe clamps to secure it until the glue cures.

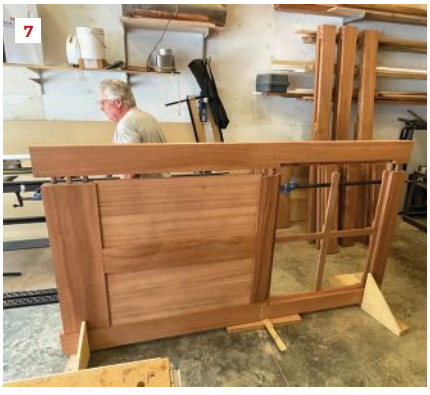
Big doors. In this case, replacing the four garage doors "in kind" presented certain challenges. I decided to build the 48-inch-wide-by-90-inch-high doors from 12/4-thick sapele in my shop with the same tools and techniques I would use on site. Due to the unwieldy size and weight of the doors—each finished door weighed 150 pounds—one of our crew members, Ed Brady, helped build and move the doors around as needed. Also, for ease of construction, I ordered the material from M.L. Condon Co. (condonlumber.net) located in Stormville, N.Y., a few towns away. It dimensioned and thickness-planed the sapele from a cut list I supplied.

The author typically builds standard 1 3/4-inch doors on site with a Festool Domino XL joiner and OF 1400 router set up with a double fence **(1)**. The new, oversized, 2 1/4-inch doors were built in the shop using the same tools and techniques **(2)**. Here, three mortises are cut in a staggered pattern rather than in line to strengthen each side of the thick door **(3)**.

Photos by Ed Brady of New Dimension Construction







Starting the assembly, a stile is placed into a door stand **(4)**. Then, the author sets the first door panel into the routed groove and inserts glue and tenons into the three bottom-rail mortise cuts **(5)**. The bottom and middle rails are tenoned to the center stile, which locks in the first door panel **(6)**. Next, the front muntin cross and top rails are tenoned and the final door panel is slid into place. The last stile is driven down tight **(7)** with a 3-pound sledgehammer and a wood block. The assembly is secured with pipe clamps on both sides **(8)**, then stood off to the side to dry **(9)**.

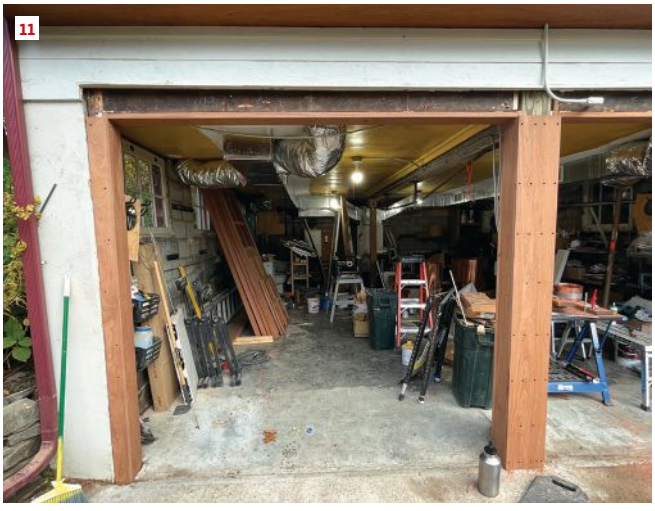
Stiles, rails, and panels. The door design called for 6-inch-wide top and middle rails with a 9-inch-wide bottom rail; the stiles were also 6 inches wide. To protect against chipping out the sapele while handling the doors, I extended the outer frame stiles an inch below the bottom rail **(2)**. I later cut off these extensions on site prior to hanging the doors.

After sizing the sapele stock, I used a Domino XL joiner to cut three mortises in the end grain of all the rails and in each shoulder (and middle) of the outer stiles. The center stile between the panels was mortised with three cuts in the end grain, while the bottom and middle rails were mortised in the middle. Because of the door's 2 1/4-inch thickness, I cut the mortises in a staggered pattern rather than in line, typical of standard 1 3/4-inch doors **(3)**. I wanted to strengthen each side of the door and prevent the butt joints from possibly opening up. Also, for added flair, I routed a bevel cut in the stiles and rails with a chamfered bit on the exterior-facing door fronts. I ran the bevel cut 2 inches shy of the corners.

For the door panels, I glued up and domino-tenoned together 1-inch-thick sapele stock, also supplied by M.L. Condon. I routed 1-inch-wide grooves 3/4 inch deep in the stiles and rails to receive the door panels, then squared up the ends of the groove with a hand chisel.

Muntins. The original doors had 3-over-3 true divided light windows. With the client's input, we redesigned the new doors to be 2-over-2, which we thought would look better and, frankly, would be a little easier to build. On the exterior-facing side of the door, I made the "front" muntins out of 1x2 sapele. I set up a compound-miter saw to half the depth to create a half-lap joint where the muntins crossed. These muntin "crosses" were later glued and domino-tenoned to the frame stiles and top and middle rails.

On the interior side, I made matching "closure" muntins, also out of 1x2 sapele, but within a removable frame just in case a glass pane were to break. The closure muntin frame fit within a 1 1/4-inch-deep-by-1-inch-wide rabbet routed into the stiles and top and middle rails. On the back of the front muntins, I applied 1/4-by-1/4-inch strips of sapele to act as spacers for the 1/4-inch tempered glass. We



Since the jamb framing and center support wall were rotted **(10)**, the author rebuilt them using PT 2x6 framing. The door openings were then trimmed out with 1-inch-thick sapele **(11)**.

Heavy-duty hinges made by RealCraft (realcraft.com) were used to hang the 150-pound doors. After the hinges were clamped in place **(12)**, holes were drilled for the through-bolts **(13)**, and the hinge strap and back plate were bolted together **(14)**.

painted the spacers black to avoid the distraction of seeing raw wood when looking through the windows.

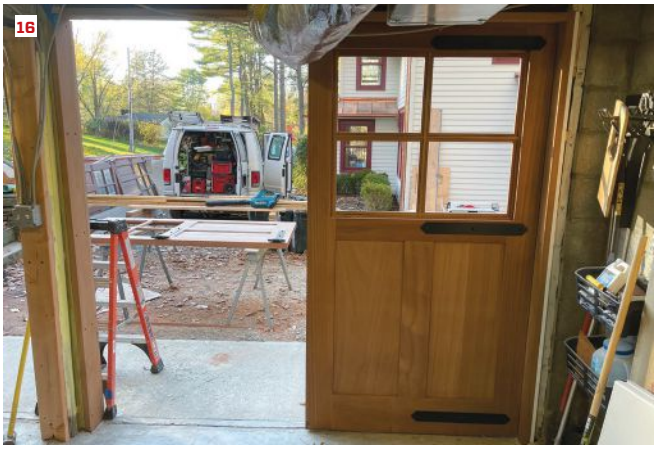
With all the door components mortised, routed, and stacked aside in four bundles, I assembled the doors one at a time.

Assembling the door. I started out by placing a stile into a site-built door stand, which I had shimmed in the middle to prevent bouncing when I drove the center pieces together **(4)**. Next, I placed the first door panel into the routed groove, then glued 5 1/2-inch-long domino tenons with Titebond III glue (titebond.com) and inserted them into the three bottom-rail mortise cuts **(5)**. After setting the bottom rail, I tenoned the bottom and middle rails to the center stile, which locked the first door panel in place **(6)**. I then tenoned the front muntin cross and top rails and slid the final door panel into place. Finishing up, I drove the last stile down tight using a 3-pound sledgehammer and a wood block. This was the hard part; the last stile had to engage 10 domino tenons, three in each of the rails and one in the muntin bar, and the tolerances were tight **(7)**.

With the door assembled, we transferred it from the stand to the workbench, then secured it with pipe clamps on both sides **(8)**. (Clamping just the top of door leaves the possibility that the joint will open up on the bottom face.) We stood the door off to the side, then started assembling the next one **(9)**.

After the glue had set, we sanded out any imperfections and glue marks starting with 60-grit sandpaper, progressively using finer grades of sandpaper for final sanding.

On site. The guest home's two-bay garage was located in the building's walkout basement **(10)**. We removed the old garage doors from the gable-end wall façade and demoed the existing jamb framing down to the block foundation. The existing support wall between the two door openings was badly rotted, so we removed it as well, then reframed the rough openings with pressure-treated 2x6 stock and the center support with a built-up PT 2x6 post. We trimmed out the door openings with 1-inch-thick sapele fastened with 2 1/2-inch exterior screws, which were countersunk and later plugged **(11)**.



The hinge leaves were attached to the rebuilt framed openings with galvanized lag bolts **(15)**. From the interior, the hinge hardware included metal back plates, which were through-bolted to hinge straps **(16)**. The panes of 1/4-inch tempered glass were set in a small bead of silicone sealant **(17)**. The finish door hardware was made by Rocky Mountain Hardware **(18)**.

Heavy-duty hinges were needed to hang the wide, 150-pound doors. The 12 hinges were purchased by others with the hope that they would work out, but they were designed with an offset that would have pushed the doors past the outside face of our trim. I was able to install the hinges backward, however, and make them work; this was accomplished by rabbeting the hinge pins into the trim. In addition, the screws that came with the hinges to connect to the jambs were undersized, so I bored out the beveled holes to accommodate beefier, 1/4-inch lag bolts.

On a bench set up in the driveway, we installed the hinges on the door. We clamped them into place **(12)**, then we drilled holes for the 1/4-inch through-bolts using a drill with a guide attachment **(13)**. The hinge straps came with a metal back plate, which is installed on the interior side of the door **(16)**. We through-bolted the hinge strap and back plate together using a ratchet **(14)**.

With the hinges attached to the doors, we cut off the 1-inch stile extensions with a track saw and installed the doors in the openings. The hinge leaves were attached to the rebuilt framed openings with four 1/4-by-2 1/2-inch galvanized lag bolts **(15)**. We later touched up the bolt heads with black spray paint.

Finishing up. We set the panes of 1/4-inch tempered glass in thin beads of silicone applied to the rear of the "fixed" front muntins. Then we screwed the removable closure muntin frame to the interior side of the door, tooling the silicone to shed water. Later, our painting trade partner finished the door with long-lasting clear sealer **(17)**, and I installed the finish door hardware (rockymountain hardware.com) **(18)**.

The last task was to install drop-down thresholds on all four doors (tmhardware.com). I chose to surface-mount them to the interior side of the doors rather than insetting them into the door bottoms, so they can more easily be replaced if they get damaged.

Dale Diamond is a partner with his son, Kyle, in New Dimension Construction, in Millbrook, N.Y.

"We Were Profitable Almost Immediately!"

Enjoy freedom and flexibility all while building wealth for you and your family! Call Window and Door Specialties now and discover how easy it is to own your own home improvement company!

- LOW START UP COST
- TOP PRODUCTS IN THE INDUSTRY
- AMAZING TRAINING & SUPPORT
- 30 YEAR BUSINESS MODEL
- FACTORY DIRECT PRICING
- NO EXPERIENCE NECESSARY

WINDOW and DOOR SPECIALTIES™

CALL NOW!
(866) 995-9022

BY MELANIE HODGDON

The Pros and Cons of Being a Visionary

My clients span the entire spectrum from visionaries to hands-on "doers." A recent encounter with a self-proclaimed visionary led me to examine both the necessity and the danger of having visionaries as business leaders.

I was amused when I read the two definitions for "visionary" in *Merriam-Webster*:

1. One having unusual foresight and imagination.
2. One whose ideas or projects are impractical.

That is precisely the dichotomy that can lead to problems in a small construction business.

PROS

To quote Oscar Hammerstein's lyrics from *South Pacific*, "If you don't have a dream, how you gonna have a dream come true?" Whether it's captured in a formal statement or it exists exclusively in a business owner's mind as a fuzzy mental picture or intention or even impulse, there must be some objective that a business is designed to fulfill. Without such an objective for a business, the actions associated with working will be pointless. You may make some dollars but never actually create more than a hobby that pays.

It may be helpful to come up with a formal "vision statement," which is different from a business's mission statement. A mission statement should be focused on the here and now: what the company does and for whom. A vision statement, however, should be inspirational and express what your ideal future with your company would look like. An example might be, "I want to be my own boss and have free time to spend with my family and enough money to provide a secure living for them." Or it might be more like, "I want to create a profitable business that will finance my retirement years." Or even, "I want to have the largest handyman service in the county, with a fleet of service vans and crews."

Notice that such statements don't talk about how to make the objectives happen; they just present a picture of what will somehow come to be. Visionaries may spend huge amounts of time figuring out what will need to be in place in order to make their vision reality. Flow charts, spreadsheets, to-do lists, and calendars may all map out pathways to reach the vision. All of this planning is exciting and necessary. But what many visionaries lack can create problems when it comes to executing the plans.

CONS

For visionaries, it's much more stimulating and gratifying to dream about what's to come than it is to grapple with the day-to-day oversight and attention to detail that are required to run a business, especially during its startup years. For example, part of the plan to make a company systems-based may be to hire key people who are competent and responsible and have the required skills. So if "hire a bookkeeper" is next on the to-do list, the position may be filled, but then oversight may not occur.

For visionaries, it's much more stimulating and gratifying to dream about what's to come than it is to grapple with the day-to-day oversight and attention to detail that are required to run a business.

I have found that among the many endearing qualities of visionaries are high levels of optimism and trust. Who wouldn't want a friend or family member with these qualities? Yet in terms of business, having an optimistic and trusting nature can permit incompetency and unprofessionalism to exist. I have seen a discouraging number of examples in which company owners have hired inept, inadequately trained, or even well-intentioned but unqualified bookkeepers and then simply turned them loose on the books, with disastrous consequences. As President Ronald Reagan was known to say, "Trust, but verify." Because they often possess this large helping of trust, visionaries tend to abdicate rather than delegate. The unfortunate result is that even qualified new employees may be turned loose without a formal orientation program designed to foster their successful integration into the company; without a structured training program; and without enough oversight.

Delegation is all about introducing new employees into the company culture, assigning them their tasks a few at a time, reviewing the results of their efforts with them, and providing

a system of supportive oversight that might include assigning a mentor familiar with the role or conducting regularly scheduled meetings to review work, get questions answered, and so forth.

Abdication occurs when new employees are tossed into a company with the assumption that they already understand the specifics of what their role demands, including the mastery of all related concepts and software; that they are prepared to meet the behavioral, procedural, and quality standards demanded by that specific company; and that they will produce excellent work that doesn't require review.

When business leaders express confidence in employees who may be secretly foundering or unaware that they are not carrying out their roles in accordance with the specific objectives of the company (such as meeting a target achieved gross margin), it becomes even more difficult for those employees to admit that they need help or are unsure about how to solve problems as they arise. Without intending to, some extreme visionaries can end up fostering ineffective practices.

So, what's the solution? If you recognize visionary tendencies in yourself, congratulate yourself on having qualities absolutely required by a successful business. Then admit that you aren't very good at some of the detailed stuff and go find somebody with complementary skills to handle that aspect of the business. You may need to personally dig into job cost reports with that new project manager; if your tax accountant doesn't speak your language, find a consultant or fractional CFO from the remodeling industry and have them review your financials. Nobody is good at everything required to run a successful business, so putting together a team that encompasses all the necessary skills should be a high priority.

Melanie Hodgdon, president of Business Systems Management, provides management consulting and coaching for contractors.

WOOD PRODUCTS FOR HOMEBUILDERS

West Fraser is a wood products company with 60+ production facilities worldwide. Our Lumber, OSB, Plywood, LVL and MDF are manufactured from responsibly sourced and sustainably managed forests. We are committed to helping builders, build better, faster and with greater efficiency.

LEARN MORE AT WESTFRASER.COM

West Fraser

BY GLENN MATHEWSON

Looking Ahead to the 2024 IRC

While the International Residential Code is in use or adopted by reference in 49 out of the 50 U.S. states (hello, Wisconsin?), the edition and amendments that apply to you are up to your state or local government. That's because while the International Code Council cyclically updates the IRC and other model codes every three years, state and local governments don't often adopt new codes as regularly as the model codes are created. As a result, there are a variety of editions of the IRC that have been adopted across the U.S.

Because state- and local-government-adopted codes are the ones that ultimately affect builders the most, I am often asked, "Why should I care about a future edition of the model IRC?" The answer is simple—the present used to be the future, so the future will become the present. How can I encourage your American civic duty to participate in your governments' future code adoption choices if you aren't aware of what they are choosing from?

As of this writing, the final version of the 2024 IRC is awaiting committee certification. The information presented in this article isn't going to be entirely useful to you until tomorrow becomes today, or until you decide to help guide your government toward what tomorrow will become. Building codes follow the will of society, and society always has trends. Code proposals are created by people, and those people often address current social trends in the codes.

AFFORDABILITY

Though it may elicit a cynical eye roll, the IRC does attempt to defend the affordability of construction and housing. While code requirements can often increase the cost of construction, many efforts were made in the 2024 edition to address the issue of affordable housing across the U.S.

For example, headroom and ceiling-height minimums have been reduced in certain conditions to help homeowners maximize the use and function of their existing homes. Many older homes are designed around stairways that don't meet current geometric requirements, and replacing those aging stairs often creates problems with headroom due to the size of the existing framed opening for the stairway in the floor system. A new section has been added to Section R502 in the 2024 IRC that permits existing stairs to be reconstructed without changing their width, headroom, geometry, or landings when restricted by surrounding existing construction.

Once you've made it to a basement or habitable attic on those stairs, more exceptions are permitted. When a previously unfinished basement or non-habitable attic is converted into habitable living space, the minimum ceiling height has been reduced from 7 feet to 6 feet 8 inches. This will allow more owners to expand the living space of their older homes, without the often-inhibiting cost of lowering a basement floor or raising a house.

Sleeping lofts. In the 2015 IRC, an appendix chapter with reduced requirements for tiny homes was added, which included a provision that allowed for sleeping lofts. In the 2024 edition, tiny homes are still covered in an appendix, but sleeping lofts will now be permitted in standard IRC dwellings as described in a new section in Chapter Three. The details in these provisions are specific and more extensive than can be explained in depth in this article, though to provide an example, distinctions are made between sleeping lofts and plant shelves or other features that could appear to be like a sleeping loft. These sleeping loft regulations are intended to keep a loft from being used as a normal habitable space or a standard mezzanine.

The code requirements keep them small: Sleeping lofts must be less than 70 square feet, with a ceiling height not more than 7 feet for 50% of the loft area and not less than 3 feet. They can be accessed with a ship's ladder or alternating tread devices, just like all other mezzanines, but they are also provided their own reduced allowances for stairway width, height, and landings. A typical ladder can also provide access but must be inclined between 70 and 80 degrees and be within other geometric limitations. This new allowance is a perfect example of a code provision based on personal responsibility. If you can't safely go to the sleeping loft, then don't go (see photo, following page).

For new construction, there are a few more allowances added to help maximize space. A shared room can now be more easily designed into a two-family dwelling (duplex) with new language that makes it clear that the shared room—perhaps for storage or laundry—must be separated from both dwelling units with the same drywall separation that is required for garages.

ADUs. Accessory dwelling units have always been something the IRC allowed but never considered as anything other than a second dwelling on a property, whether stand-alone or attached. Typically, it has been local zoning ordinances that have prohibited the construction of a second dwelling on the property, or a second kitchen within a dwelling for creating a mother-in-law suite. In 2024, a new appendix chapter for ADUs has been added that provides specific limitations on an ADU such that it is not considered as a full second dwelling or as a duplex when attached.

Under the IRC's new guidelines, an ADU can be within, adjacent

to, or detached from the primary dwelling, but cannot be less than 190 square feet or more than 1,200 square feet in area. To keep an ADU subordinate to the primary dwelling, it cannot be greater than 50% of the larger dwelling's area and must have its own means of egress from the exterior or from a common hallway within a single building. In addition, an ADU can have no more than two bedrooms.

Access to the main electrical shut-off for a single building containing both dwellings must be accessible to occupants of both dwellings, and overcurrent protection and disconnects for each dwelling must be accessible to that dwelling's occupants. Requirements are similar for water service and shut-offs.

One important feature in these new provisions is that when the ADU shares a building with the primary dwelling, the standard one-hour fire separation required between units in a duplex is not required between the ADU and primary dwelling. However, to take this allowance, the smoke and carbon monoxide alarm systems must alarm in both dwellings when detection occurs in either dwelling. If not interconnected, the one-hour separation is required. As with all the subjects I'm sharing here, there are additional details you should seek out if interested.

GUARDS

In addition to having new code provisions for exterior guards on decks, the 2024 IRC also addresses interior guards. When they are fastened to the edge joist of a floor, conventional floor construction is not designed or suitable for the transfer of guard loads into the floor framing. Fastening a post to only the floor sheathing and a narrow edge of the floor framing can often cause the outer floor framing member to rotate.

New sections in Chapter 5 require roll blocking or a joist, depending on the joist direction, to be installed at the edge of floor framing at every guard post location, and the edge joist must be at least equivalent to a double 2x10. If roll blocks or joists are not located at each guard post location, the outer member must be a minimum of 6x10 sawn timber or $5^1/_8$x$9^1/_4$ glued-laminated timber with joists or roll blocks every 48 inches. The roll blocking must be at least as deep as the joist and fastened according to the section.

VAPOR RETARDERS

Vapor management methods have been modified and expanded over the last decade of code development. A change to the 2021 edition upped the longtime standard of 6-mil poly under a concrete slab to a 10-mil product that is compliant with an ASTM standard. This was successfully challenged in the 2024 code cycle as an unnecessary measure with limited market choices for products that met that standard. As a result, this provision was revised back to the 2018 language.

Another proposal simplifies the use of other vapor retarder products that have particular characteristics. For example, some vapor retarders become more vapor permeable under wet conditions, a characteristic measured by the "wet cup" ASTM method of testing vs. the "dry cup" method that's used to determine a product's listed perm rating. In the 2024 IRC, a new definition has been included for "responsive vapor retarder" that applies to retarders with a Class I or II dry cup permeance and a Class III wet cup.

New provisions in the 2024 edition of the IRC allow for sleeping lofts of less than 70 square feet, with access from a ship's ladder or alternating-tread staircase, as shown here.

Photo: Roe Osborn

Among other expected changes to the 2024 IRC are new standards for smoke/fire detectors that will reduce nuisance alarms, and a requirement that they be installed in accordance with the manufacturer's instructions (surprisingly, this is not already required by code). There are new prescriptive truss bracing provisions and new appendices for hemp-lime construction and extended plate construction, while the energy, electrical, plumbing, and mechanical chapters will all have their share of upgrades, corrections, clarifications, and new recognitions.

Because the model IRC is often a starting point for what the administered code in each community becomes, making yourself aware of the changes in the next model code strengthens your ability to contribute your voice to your local codes, the ones a lot closer to home.

Glenn Mathewson is a frequent presenter at JLC Live and a consultant and educator with BuildingCodeCollege.com.

COMMITTED TO GETTING YOUR JOB DONE. EASIER.

When your workday needs flexibility, we're there for you. Place orders, track deliveries and manage your account details with myABCsupply in the office or remotely. But when you need a friendly face, ABC Supply associates are just a phone call or click away, ready when and where you need us.

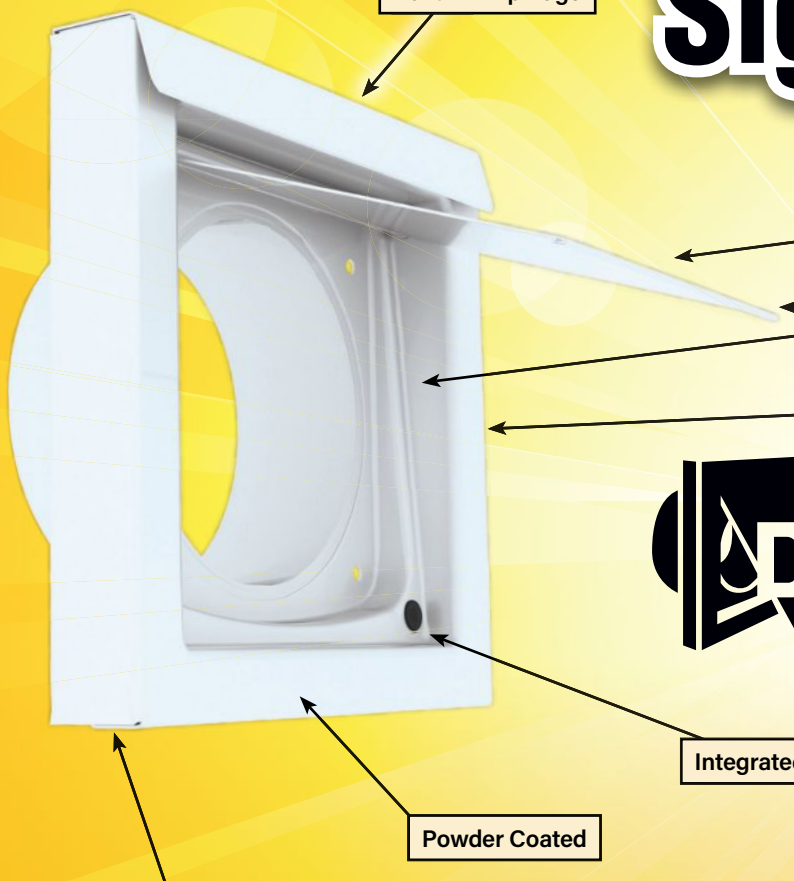
Go to **myABCsupply.com** or download the ABC Supply app.

ROOFING | SIDING | WINDOWS | TOOLS | GUTTER | ACCESSORIES

ABC Supply Co. inc.

Upon Closer Inspection Excellence Stands Out

Sight To See



DryerWallVent®

While the DryerWallVent blends in at a distance, you'll discover unique details that make it stand out when looking closely.

Deep-Drawn Galvalume® steel and powder coating ensure this sharp vent closure will look good now and long into the future.

Deep-Drawn
Galvalume® Steel
Powder Coated - Shown White
Model DWV4W

The Dryerbox® People

Made in the USA

INOVATE

888-443-7937

Visit DryerWallVent.com

Repairing a Termite-Damaged House

Fixing the trail of destruction left by these hungry critters is a team effort

BY ROBERT MIGNOGNA

Every so often, my residential remodeling company, Professional Building & Renovations, in Bowie, Md., gets a call to assess and repair a home damaged by termites. If left unchecked, these pesky insects can cause damage so extensive that entire walls must be replaced to return the home's structural integrity. Any home framed with wood, no matter the foundation or exterior siding, is susceptible. As a result, we have replaced all types of exterior and interior wall systems, from brick to vinyl siding (see "Replacing a Rotted Rim Joist Behind Brick," Dec/16).

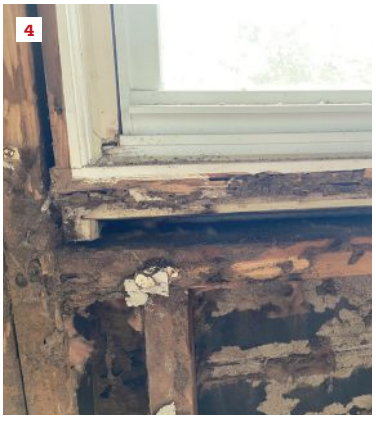
Last year, a local family was removing furniture from their parent's house in preparation for listing it for sale with a real estate agent when they found some damage that they suspected had been caused by termites. In September, they contacted us, seeking our services to repair the damage on the two-story, colonial-style home, which had been built in the early 1960s.

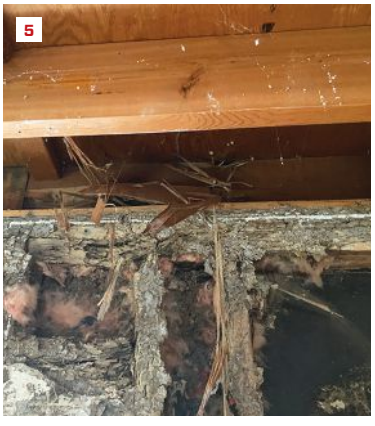
HIDDEN DAMAGE

The discovery point of damage was in the home's living room along an exterior wall, where a large wooden bookcase had been located for many years. One of the homeowner's books simply disintegrated in a family member's hands when it was removed from the shelf, along with the shelf and half the bookcase. The discovery was a shock, as there were very few visible signs that a problem existed.

Photos by Robert Mignogna

Most of the termite damage to the framing occurred on the ground floor in the living room **(1)**. Damage was also found around a second-floor window **(2)**, so the author removed the drywall and insulation along the bedroom wall to determine its extent **(3)**. In several structurally significant areas, termites had transformed the wood framing into a papier-mâché-like material **(4, 5)**.





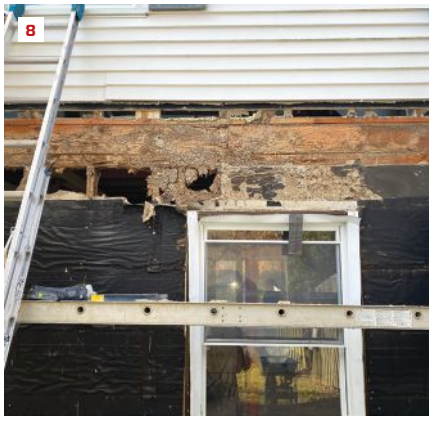
The family initially contacted another contractor, who removed some drywall and insulation from several interior walls to inspect the damage but ultimately declined to take on the repair project. Meanwhile, they hired an exterminator who confirmed their suspicions that termites had caused the damage and subsequently treated the area around the foundation and the now exposed interior and existing exterior walls with a termite bait system consisting of small, treated plastic spikes pounded into the ground.

Assessment. When I arrived on site to assess the situation, the room had been cleaned and emptied of most of its furniture. With the framing exposed, I could see that even the vinyl replacement windows were damaged; the destruction of the existing header and wooden window jambs had resulted in increased weight on the frames. All of this had been hidden from view behind the drywall. To the family's knowledge, damage was confined to framing and structural support members along two exterior living-room walls and near a window in the second-floor bedroom, located directly above the living room.

In a situation like this, we typically will conduct a second, more thorough inspection to determine the extent of damage and to provide a repair cost to the owner. I typically charge a base price for our services that covers our initial time to conduct an investigation and take field measurements. When completed, we provide a detailed line-item cost estimate that includes costs for us to obtain the building permit and other professional fees associated with the repair.

Given the issues that can arise from these types of repairs, we have found that an architect is an indispensable resource to have on a project like this. We work with an excellent one, Stephen O'Neill, of O'Neill Architects, who provides us with the architectural drawings that are eventually submitted to the local building officials for permit review, determines potential building load-path issues, calculates header and rafter size requirements, determines crucial connection points between the framing and foundation, and understands the need to update existing framing to meet current code requirements. Additionally, I have found that it never hurts to have another experienced professional on your team and someone who wants to be involved in the field inspection.

Second field inspection. When we returned to the house to conduct our field inspection, my crew and I removed the remaining drywall from exterior walls both in the living room below and in the bedroom above, exposing a significant amount of damage between the first and second floors. The second-floor rim joist, the double top plates, sill plates, and window headers resembled papier-mâché.



On the exterior, workers carefully removed vinyl siding from the damaged area so it could be reused **(6)**; the mulched planting bed next to the foundation probably contributed to the termite problem. Before tackling the damaged wall framing, the crew supported the second-story floor system, which had sagged almost 3/4 inch **(7)**. To repair the damaged rim joist **(8)**, they fastened a doubled 2-by "ledger" to the second-floor studs as a lifting point for 4x4 posts bearing on hydraulic jacks **(9)**. Once the rim joist had been repaired with new 2-by material, the rest of the wall framing came apart easily, all the way down to the disintegrated plates where the termites had first gained entry **(10)**.

While Steve took field measurements, we spent a couple of hours examining the exposed studs for any additional signs of damage. This included locating mud tunnels that termites use to move from the ground into walls along a slab-on-grade foundation.

In our area, code requires slab-on-grade foundations to be no less than 6 inches above finish grade. On older homes like this, we often find dirt and—even worse—mulch (we call it termite candy) against the siding, thereby putting the grade above the slab and even with, or slightly above, the wall. This provides a path where termites can construct mud tunnels directly into the wall framing, thereby avoiding sunlight. Here, we found that along the damaged walls, grade measured only between 2 and 4 inches below the top of the slab and even closer to the bottom plate due to an offset in the concrete slab. This condition more than likely contributed to the termite infestation.

We estimated that approximately 20 lineal feet of the exterior and interior wall structure would have to be replaced on the first floor, along with two first-floor windows. On the second floor, the damage was less severe and would require replacement of only a jack stud beneath a window header and a few wall studs. We also noted the home was sided with vinyl siding over 1-inch-thick foam board that was installed over the original 18-by-24-inch siding panels. From experience, we knew these panels—which accounted for between 7/8 inch to 1 inch of the exterior wall assembly thickness—contained asbestos particles and would have to be removed and disposed of by a certified asbestos abatement company, and could not be reinstalled.

PLANNING AND REVIEW

Guided by our field inspection and our discussions about structural issues, Steve prepared his preliminary set of drawings and had them ready for review in a few days. To keep the budget in check, we decided to reuse the vinyl siding and vinyl shutters, but we would have to install new windows.

To match the appearance of the other windows on the house, we needed to build frames around the new ones and wrap them with aluminum coil stock, though this is not our preferred trim method. Our goal was to make the repair work indistinguishable from the original, but with supply shortages and lengthy window lead times from our vendors, placing an order for an exact replacement would have resulted in a long wait. Instead, we found stock replacement windows from Home Depot that were similar in size and quality to the other windows on the house, which would allow us to keep the job on track.

Before reframing the walls, workers installed a copper termite barrier over the edge of the slab foundation **(11)**, then used wedge anchor bolts to fasten new pressure-treated plates to the slab **(12)**. Once the walls had been reframed and fitted with the proper hardware to reinforce the connection to the existing framing and foundation, the post jacks were slowly removed **(13)**.

After completing the preliminary work and doing the material take-offs and the cost estimate, including subcontractor pricing for asbestos removal, electrical and plumbing work, and architectural and engineering services, I submitted a final proposal to the family for approval. Early fall in our area can be very wet, so we had to rearrange our work schedule to do the exterior work first. Upon receiving the OK to proceed from the family, Steve "fast tracked" the permit application, and we were ready to begin the following week.

STRUCTURAL SUPPORT AND DEMO

To determine if the damaged sections of the exterior walls caused any deflection in the second-floor structure, we established a laser control line at the top of the double wall plate and extended it from the front of the living room to the farthest corner of the rear wall. This line—which revealed a deflection of the floor joists that ranged between 5/8 inch and 1 inch from the undamaged wall assembly to the damaged sections of wall—would be referenced throughout the remainder of the project for all elevation measurements involving windows, trim, and other fixed objects.

Next, we installed three rows of screw jacks topped horizontally with 4x4 posts long enough to span eight floor joists. The entire area supported was about 140 square feet. Then we applied even pressure to each post, counting the revolutions on each until we removed the deflection over the damaged walls to obtain a positive rise of 1/4 inch. This would give us room to complete the repairs and transfer the weight onto the newly repaired walls. The top of our new wall would be framed to the established laser control line.

Next, we removed the vinyl siding and numbered it for reinstallation, followed by the 1-inch exterior foam insulation board, thereby exposing the original siding panels. That was as far as we could go; we marked only the panels that needed to be removed and called in the asbestos abatement company.

After the abatement crew finished its work and gave us an all clear, we set up hydraulic jacks on the ground with 4x4 posts to take weight off the rim joist located on top of the damaged wall. This was done because that small—yet important—section of wall ran parallel with the floor joists above and was supported only by the damaged rim joist and walls below. To provide a lifting point for the posts, we attached double 2x4s to the exposed studs in the second-floor exterior wall, forming a ledge on the outside of the wall.

We needed to take only enough weight off the wall to get the new rim joist in place. However, before the damaged rim joist could be cut and removed in sections, we sistered a new 2x8 with polyurethane glue and #10 Spax structural screws to the inside section of rim joist, making sure to extend the new board at least 4 feet beyond where we planned to make the splice cut, as we did not need to replace the entire length of rim joist on that wall.

After that, we moved outside and cut out the damaged rim joist. This procedure worked well and provided additional support for the second-floor assembly.

Demo and removal of the studs and wall assembly, as one might imagine, was rather easy; the materials weighed half their normal weight, and the compromised wood severely reduced the holding power of the nails used in the wall construction. The header and window framing along with the sill plate on the back wall sustained the brunt of the damage and could literally be removed by hand.

WALL FRAMING

We began our framing work by adding a length of termite barrier to the formed edge of the concrete slab, per Steve's specifications and local code. We used a product called YorkShield 106 TS, which is a single sheet of 2-ounce copper laminated to a polymer layer with a rubber adhesive, which separates the copper from the preservatives in treated lumber. This was followed by foam sill-plate gasket and a pressure-treated sill plate, which we attached to the slab with concrete wedge anchors every 6 feet. Then we nailed a second plate over the bottom plate.

Next, we installed the double 2-by plate at the top of the wall,

being sure to line it up with our laser control line. We built the walls in place and cut each stud to fit the opening every 16 inches on-center. Steve called for the installation of Simpson Strong-Tie DTB-TZ tie-back anchors at various locations in the corners and where existing walls met the new wall. These were installed with longer wedge anchor bolts through the sill plate into the concrete slab and secured to the studs with special fasteners. This connection detail was designed to protect against uplift and securely anchored the existing and new walls to the concrete slab.

After the walls were in place, we removed the post jacks, once again slowly transferring the weight onto the walls. A quick check revealed that all the wall plates were now aligned with the laser control line.

FINISHING UP

For repairs like this, we like to use Zip System sheathing, because we can quickly install the panels and tape the seams without having to install housewrap. After installing the windows and sealing them to the sheathing with Vycor flashing tape, we ripped some 2-by material to size to picture-frame the windows, then wrapped the trim with white aluminum coil stock, completing the installation with drip caps above the frames. Once installed and trimmed, the new windows were indistinguishable from the others on the house.

To account for the thickness of the removed 18x24 lap panel asbestos siding (which, as mentioned earlier, could not be reinstalled), we installed 2-inch-thick Owens Corning foam insulation board over the Zip sheathing with aluminum fasteners. This matched up perfectly with the existing foam insulation that was used when the home was sided with vinyl. We cut and installed new J-channel around the new windows and reinstalled the existing siding, using control lines to ensure that the nailing flange on the last row of siding lined up with the bottom of the top row of siding above our repair area.

On the interior, we thoroughly cleaned the stud bays on the first and second floors and sprayed them with a coat of primer/sealer. Then we used nonexpanding spray foam insulation to air-seal all the bays (to include the new walls), joints, behind receptacles, and around windows before scheduling our first inspection. After receiving the OK from the inspector for the framing and air-sealing, we insulated the walls with R-15 fiberglass insulation batts, along with the rim joist above the walls in the living room.

Once we received our close-in approval from the inspector, we hung and finished the drywall, applied a coat of primer, and installed the baseboard and window trim. We then applied finish coats of paint and laid down new carpeting in the living room and bedroom. Six weeks after beginning work, we completed our final inspection.

Robert Mignogna owns Professional Building and Renovations, in Bowie, Md. He can be reached at robert@probuildandren.com.


14

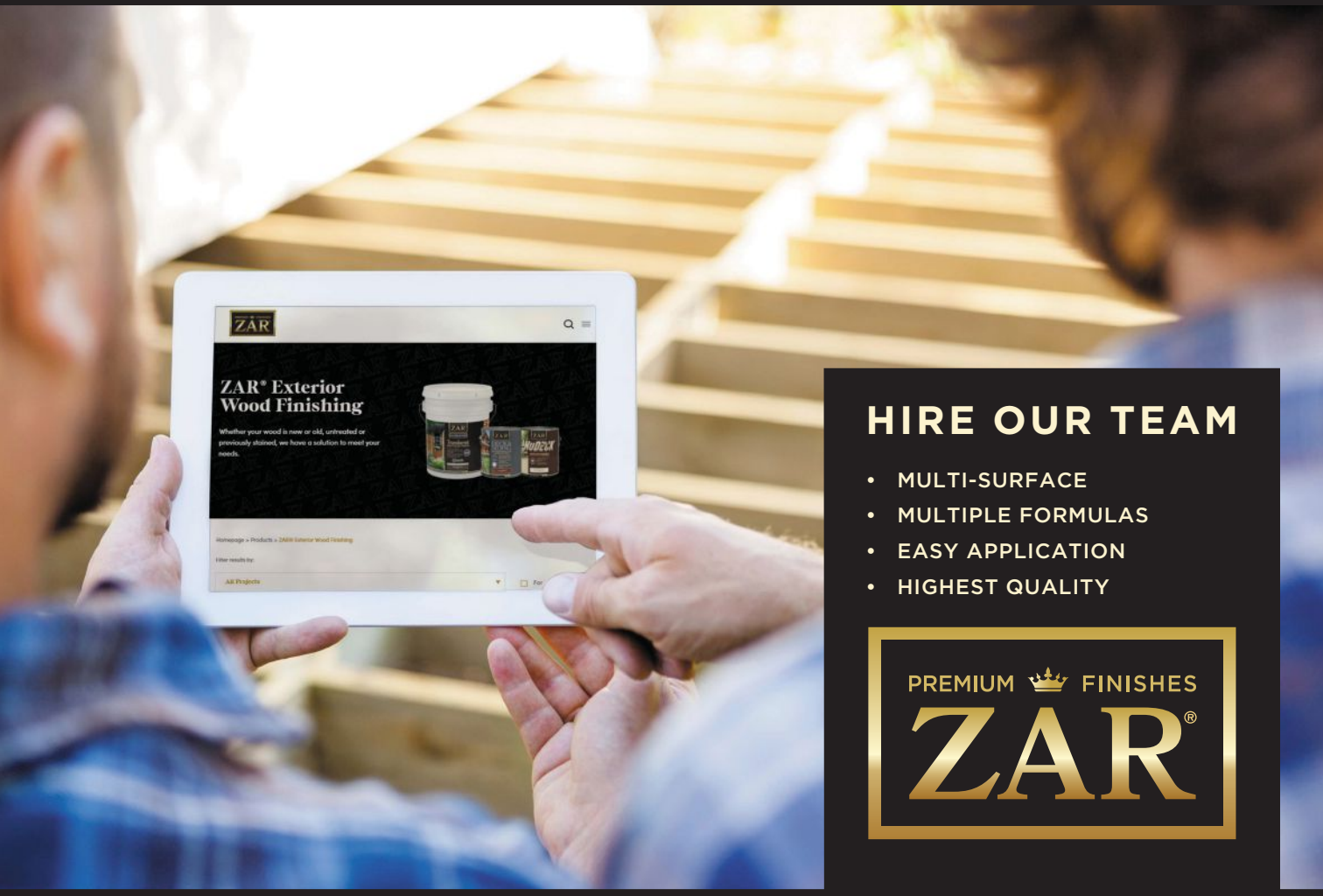

15


16


17

After sheathing the walls **(14)** and installing the new windows **(15)**, the crew wrapped the new window trim with coil stock to match the existing windows and reinstalled rigid foam insulation and vinyl siding **(16)**. The repaired wall looks like it had never been damaged **(17)**.

Searching for the Perfect Finish



HIRE OUR TEAM

- MULTI-SURFACE
- MULTIPLE FORMULAS
- EASY APPLICATION
- HIGHEST QUALITY

PREMIUM FINISHES ZAR®

ZAR® DECK & SIDING

WATERPROOF SEALER THAT MAINTAINS THE NATURAL COLOR OF WOOD

CLASSIC OIL FINISH THAT ENHANCES THE NATURAL BEAUTY OF THE WOOD WHILE ADDING RICH, TRANSLUCENT COLOR

SOLID COLOR COATING THAT DELIVERS GORGEOUS COLOR WHILE ACCENTING THE WOOD TEXTURE

NON-SLIP COATING THAT RESTORES DAMAGED AND AGED WOOD AND CONCRETE

UGL® UNITED GILSONITE LABORATORIES

YOUR PROJECT'S SUCCESS IS OUR GOAL. CONTACT US: www.ZAR.com | 1-800-845-5227

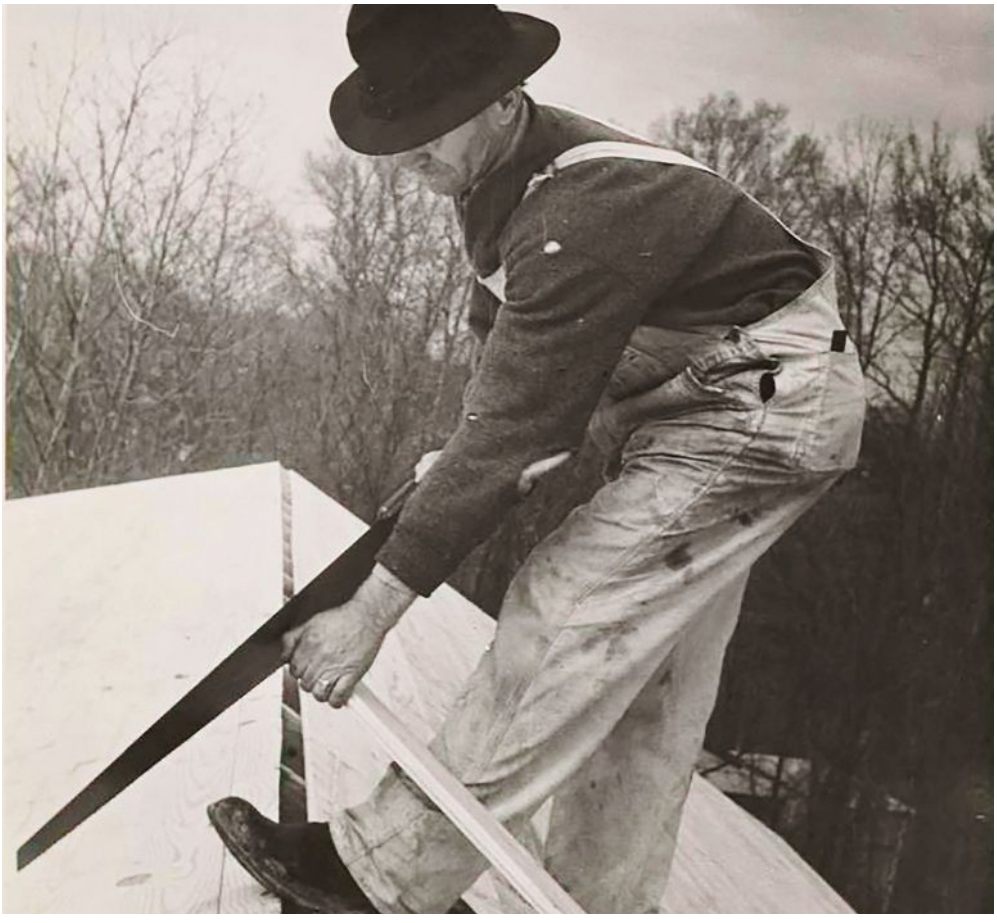


Photo: Carl Mydans for Farm Security Administration (1936)

Untangling the Skilled Labor Knot

For starters, it's a good thing that productivity is down

BY CLAYTON DEKORNE

In September 2019, I wrote "How Will Construction Solve Its Skilled Labor Crisis?" for *JLC*. That article defined the scope of our industry's labor problem and pointed out that we can temporarily solve for skilled labor by paying well and offering employees an appealing mix of benefits (including authentic gestures that foster a feeling of respect toward employees and pride in belonging to a crackerjack company), but ultimately our industry faces a demographic challenge: Skilled tradespeople are aging out, and we must attract more young people. The article prompted a flood of letters and emails, and a number of speaker invitations. It seemed I'd touched a nerve by uttering, "What never gets discussed in industry reports, but may prove to have the greatest impact on the lack of youth participation, is the issue of social class. Young people today don't want to align with outmoded, underserved, and culturally marginalized social groups. Put bluntly: Young folks don't want to be associated with what they perceive as low-class work."

REVISING THE "SOCIAL CLASS" THESIS

While I still feel there is some inherent truth in this "social class" thesis, it needs updating. First, I feel strongly that the idea of construction being perceived as low-class work is not everyone's reality. It's a social construct born out of a long history of public education choices, which I detailed in my previous article. A key marker in this history was the Smith-Hughes Act of 1917, which provided matching

The next generation of carpenters. Currently, about 20% of the construction workforce is age 55 and older, according to the U.S. Census Bureau, suggesting that a substantial portion could retire in the near future. This highlights the need to attract more youthful talent to the industry.

Women comprise about 11% of the construction workforce, but only about 4% are employed in field occupations. Making room for them in field operations could go a long way to filling the void.

funds to states for vocational training and, however unintentionally, set up conditions for tracking students along two career paths—one for the college-bound and another for the manual trades. This law remained in place until 1963, long enough for America's social strata to become deeply etched by the separation of an academically trained "professional class" and a poorer, marginalized "working class." Some of us have been conditioned to continue accepting this separation even though meaningful public vocational training is no longer widely available. (It's important to recognize that some effective school programs persist or have been made anew; we will come back to these.) What's important to understand (and that I was slow to acknowledge myself) is that this social pattern is largely ingrained as a historical condition and might not be true for everyone today. The U.S. Census sorts the population by profession but does not track the career paths that led to those professions, and in the absence of wide-scale institutional trades training, the career paths for our industry's workforce are immensely diverse.

A false dichotomy. There is a rallying cry, led in part by celebrity figures like Mike Rowe and Mike Holmes, to join the trades to avoid a high-priced college education, which saddles too many young professionals with years of debt. While parts of that may be valid, it puts college in poisonous opposition to the trades, which I think is a mistake. It's unnecessary and perhaps destructive to create a separation and make joining the trades or going to college an either-or choice. I've worked with carpenters and plumbers and roofers who have academic degrees, even advanced ones. I've also worked with a host of trade professionals who have pursued completely different professions before turning to work in the building trades, and many of them do not think college was a mistake. However much college might seem like an expensive diversion, for many, regardless of the field they studied, college proved a critical time of learning to think, of gaining exposure to a wide range of useful methods for organizing and analyzing work, and of forging a diverse network of intellectual and social support.

I whole-heartedly agree that college must not be deemed the only path to professionalism, as our public education system still presumes. But we also can't let the pendulum swing all the way to the opposite conclusion and surrender to a strict avoidance of college as the way to a successful career in the building trades. Indeed, what we fiercely need is to embrace everyone, regardless of background. By "background," I mean education and experience, but the larger context also pertains. To solve the demographic challenge, background must also encompass gender and ethnicity and family types and any other sort of distinction that separates us. On so many levels, division is not working. For the sake of fostering better building trades and increasing professionalism in the workforce, let's maintain an open mind and find common ground at every level.

Room for growth. According to the Home Builders Institute (HBI) Construction Labor Market Report, women comprised only 3.7% of construction and maintenance field occupations—the jobs that account for the largest number of employees in construction and where additional workers are most needed. (Though women are 11% of the total construction workforce, they're predominately employed in sales, management, administrative support, and business and financial operations.) Hispanics are overrepresented in field occupations in the construction industry, comprising 31.5% of the workforce compared to 18.8% across all industries (which closely mirrors the percentage in the total U.S. population at 18.9%). However, Hispanic participation varies widely by state: In Texas and California, Hispanics make up over 50% of the construction workforce, while in Vermont, West Virginia, and New Hampshire, they represent less than 1%.

Non-Hispanic whites account for 59% of the construction workforce, about the same as across all industries (59.6%) and the total

Photos: left, Richard Laughlin, Casa Über Alles; right, Adobe Stock

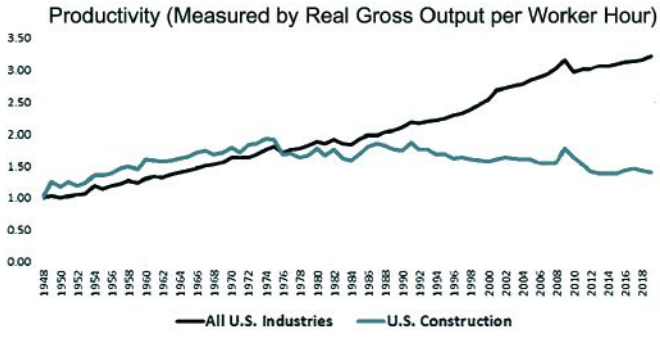
U.S. population (57.8%). Blacks (at 5.9% of the construction workforce vs. 13.9% of the total U.S. population) and Asians (1.6% vs. 6.2%) are underrepresented in the construction workforce.

Measuring excellence. The second "Aha" that helped me understand that my social-class thesis might be too simplistic came from reading *Shop Class as Soulcraft* by Matthew Crawford (see my review, Feb/20). Crawford makes a convincing argument that everyone—white-collar and blue-collar alike—suffers at the hands of a 20th-century trend toward "scientific management" that strives to separate thinking from doing. What was being forged in business schools and in the halls of newly minted industries around the same time that the Smith-Hughes Act was enacted was a corporate style of management that quickly dominated every industry. Under the scientific management model, managers spend their time planning and training, while workers perform their tasks "efficiently." This has concentrated the decision-making among a select group of managers and automated the production process, initially using simplified work routines, and later, as the technology developed, using machines.

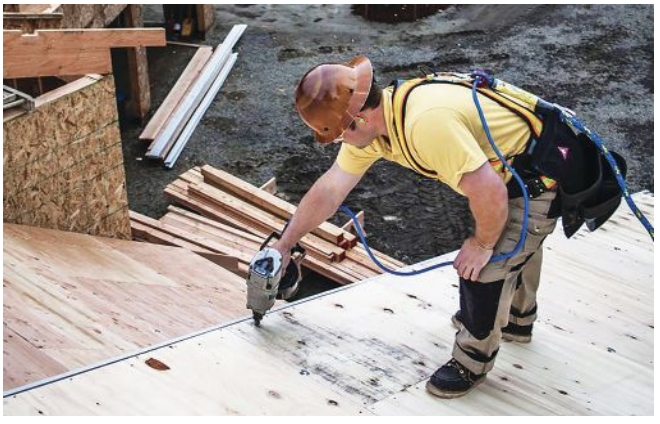
The scientific management model depends on managers to set the workers' performance standard—an abstract standard that is governed by a desired productivity rate. The worker's understanding of the product, of its quality, and of the product's intended performance are irrelevant to the production process. If workers are designing or making a tangible thing in the usual mass-production environment, they are alienated from the situations where those things have purpose.

Crawford argues that manual work is more fulfilling because it is directed by the work itself. That is, the measure of performance is defined by the work, not by an arbitrary standard defined by a manager. For Crawford, who is a motorcycle mechanic, the standard of good work is indisputable: Does the motorcycle run clean or not? Carpenters have a range of indisputable truths about their work: Is the house frame level and square or out of whack? Are the miters uniformly tight or gaping at the heel or toe? Is the airtightness level lower or higher than 3 ACH50 (or 0.6ACH50, or whatever performance measure—not productivity measure—is set for the project)? Some truths are easier to grasp than others, and most of them need to be learned; they are rarely self-evident. Will water condense on the back of the sheathing? If so, will it dry out in a reasonable time or grow mold and rot? Will water drain through the assembly or get caught by a reverse lap and leak? Many building truths also require time to manifest. Callbacks are vital learning experiences, even if they come at a painful cost.

Stretching this out, we can begin to formulate possible solutions for attracting and retaining skilled workers: Do you reward workers for performance? The number of days without a callback might go hand in hand with number of days without an accident. Both safety and work quality are tangible results that can become motivations in the hands of the right business. Another way to reward quality and safety is through profit sharing, as profits will trend higher with fewer accidents and callbacks. Companies that are "employee-centered" (to lean on a term David Gerstel articulated in



Construction productivity began to lag shortly after OSHA formed (1971) and the OPEC oil embargo (1973) raised demand for energy-efficient buildings. Coincidence or cause?

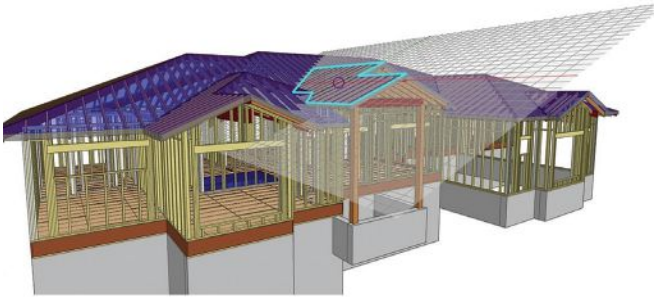


Working safely unquestionably takes more time. Still, falls remain the leading cause of injury and death in construction, though death rates have fallen sharply in the last 25 years.

Building better takes more time. It's not terrible that the productivity rate in residential construction has decreased. No one wants to live in a house built fast and cheap.

Chart data from Jesse Livemore, *Philosophical Economics*; photos: top, Tim Uhler; bottom, Tim Healey

Houses aren't iPhones or cars. The transportation challenges of moving prefab housing suggest that off-site methods will work only in select, concentrated markets where demand is high enough to justify the intense capital expense of setting up a housing plant. Currently, only about 3% of U.S. housing is built off site, and given the geographic expanse of the U.S., off-site methods will probably never fully meet demand.



Construction is seeing radical digital improvement. One example is MiTek's Sapphire, which can generate a 3D "BIM" model, optimize the framing, and spit out a bill of materials (BOM) to send to suppliers.

his article "The Employee-Centered Company and Your Financial Freedom," Mar/23) prove especially successful at nurturing and retaining a skilled workforce.

Construction has avoided a complete takeover by scientific management for a number of reasons. For starters, construction doesn't easily and inexpensively lend itself to a factory environment, where efficiency experts have been most successful at consolidating the decision-making and reducing labor to series of isolated steps. That is not to say construction can't be translated to the controlled conditions of a factory. The resurgence of interest in what is now dubbed "off-site construction" speaks to the industry's yearning to improve construction productivity.

THE LABOR PRODUCTIVITY OBSESSION

First, let's touch on productivity, as it's closely tied by policy makers and pundits to the skilled labor gap. The predominant thinking is that we can increase productivity by reducing the amount of labor used to produce buildings. Productivity is generally defined as output (in our case, buildings, in a specific amount of time) over input (multiple factors: labor hours, fuel, materials, equipment, purchased services needed to complete a building, and so forth).

The trouble I have with productivity is that it often equates with producing the most stuff in the shortest time. Typically, labor is the chief expense, so multifactor productivity is skimmed over and labor productivity (focusing on just one input among many) used as a shorthand. It's easier to measure and timely data is readily available, and it works as a shorthand because changes in other inputs change labor productivity. But it also tends to obscure true productivity, which is building the most stuff with the least expense. Either way, however, productivity boils down to building fast and cheap, and experience demonstrates that no one wants to live in a house built fast and cheap. While owners often go with the lowest bid, the history of housing shows that the truly fast and cheap houses (Levittown, house trailers, shanties) are not what homebuyers are looking for.

A look at the timeline showing a comparison of construction productivity with other industries (see chart, previous page) reveals that the lag in construction begins in the 1970s. These figures lump all construction types together, but the pattern and timing hold true for residential construction. I can't help but notice that the lag begins shortly after 1971, when OSHA forms and just around the time of the OPEC oil embargo that raised widespread demand for more energy-efficient buildings. Brian Potter (whose exceptionally smart newsletter, *Construction Physics*, recently took up the relationship of construction productivity to construction safety) makes the case that safety requirements have had a greater impact on construction than on other industries, helping to link increased safety with lower construction productivity. He concludes that while certainly part of the story, it hasn't had as big an impact in residential construction because, in his opinion, not many residential construction workers abide with regulations such as tying off with fall arrest equipment near a leading edge. I have a different experience within the *JLC* community, where I think there has been increasing interest in providing employees with a safe work environment as an authentic action of care for their well-being. It's a central tenant of Gerstel's employee-centered company, which provides the best blueprint I know for attracting and retaining a skilled workforce.

The correlation of construction productivity to energy-efficient building practices, and to better building standards in general, is a more speculative leap than the safety correlation. It derives from a general premise that construction quality and building performance are better drivers of long-term economic strength for housing than measures of productivity. Houses, or even roads and power plants don't make good consumables and probably shouldn't be measured by the same economic measures as cars, iPhones, or paper plates.

Photo: Roe Osborn; rendering: MiTek

THE TECHNOLOGY RUSE

Economists generally point to four common levers to pull to increase industry productivity over time:

- Technological advances.
- Improved worker skills.
- Improved management practices.
- Economies of scale in production.

Productivity rates for multifamily construction are higher than for single-family homes, so economies of scale do matter. However, our chief concern here is with the single-family residential sector (though long-term, housing affordability will likely continue to tilt the residential industry toward multifamily).

Let's ignore improved management practices. Building on Crawford's critique outlined above, we've established that management practices based on separating thinking from doing seem to conflict with sustaining a fulfilled and accomplished workforce. That leaves technological advances and improved worker skills as viable drivers for improving productivity.

Off-site construction methods continue to be the oft-cited solution for increasing construction productivity and for bringing the construction workforce under the control of scientific management practices, but we have a long way to go before realizing any meaningful change. Since I wrote my article in 2019, off-site methods have backslid to around 2.5% of the 970,000 new homes built in 2021 (the most recent U.S. Census figures), with the remainder (946,000) being stick built. That's a huge margin. At the very least, it will be decades before we significantly change the proportion of off-site to stick-built homes. True, the U.S. population is shifting away from rural areas, which make up the majority of U.S. land area. But I think the economics will never pan out to make off-site the majority building practice: Whenever I hear someone say we ought to build houses like cars, I ask them, how many houses fit on a truck? While there is no question off-site methods will play a greater role in concentrated building markets where housing demand is strong enough to justify the intense capital investment needed to set up a housing plant, the industry is unlikely to consolidate around large corporate building solutions that can satisfy the housing demand across all urban and suburban markets. The investment is too steep and the transportation requirements too great. In countries like Sweden, off-site methods comprise 85% of housing. But Sweden has a landmass about the size of California, which makes up only 4.3% of the 3,796,742 square miles that comprise the U.S. landmass.

Technology is playing a meaningful role in improving housing productivity in the form of more sophisticated building components, however. Drywall, window and door units, plywood (then OSB, then Zip System sheathing), trusses, I-joists, structural insulated panels, and insulated concrete forms are all examples that have meaningfully shaved time off the production process.

We have also witnessed homegrown solutions that improve safety and jobsite efficiency like Tim Uhler's methods of preassembling the eaves and siding on rake walls before standing them (see "Rake Wall Framing," Sep/14). Lee McGinley realized considerable savings in time and increased safety by prefabricating roof assemblies on site and lifting them into place with a crane (see "How to Safely Frame a Roof on the Ground," Apr/14). Companies like Davis Frame Co. in Claremont, N.H., and Sprowl Building Components in Searsmont, Maine, have been

Building faster and safer: Tim Uhler installs the siding, vent, and eaves on rake walls before lifting them in place.

Prefabrication doesn't always need a factory. Lee McGinley found it safer and more efficient to build this roof assembly on the ground and crane it into place.

A range of new technologies in residential construction have sped up construction while improving energy efficiency. ICF foundation forms are an example.

Photos: top, Tim Uhler; center and bottom, Lee McGinley

panelizing walls for more than 30 years. The history of homebuilding has been a continuous evolution of building components and process improvements. So why has productivity essentially been flat since the pre-WWII era? Precisely because we are building vastly better homes today and killing fewer workers in the process.

THE BUILDING TRADES MARKETING CHALLENGE

This brings us to improving worker skills as the most promising way to improve construction productivity. The astute reader will undoubtedly wonder why, if this was my thesis to begin with, it's taken me all the way to the end to get to it. The reason is that I am compelled to address pundits, policy makers, and tech companies that persistently seek to "fix" construction, rather than recognizing the unique challenges of residential construction apart from agriculture, manufacturing, and wholesale/retail industries. If the investment made in Katerra—the Silicon Valley-based company founded in 2015 that promised to "disrupt the housing industry" by vertically integrating the entire supply chain, design, and building process, but went bankrupt in three years after blowing through $2 billion—had been applied to developing construction skills training, we would be well on our way to improving productivity.

Many effective programs are in play already, which could benefit immensely from meaningful investment to help them scale and replicate throughout the U.S. Examples of programs that are working but reaching only a fraction of residential construction workers include Nora Spencer's Hope Renovations, which prepares women for careers in the construction trade through a 12-week pre-apprenticeship program; YouthBuild KCK, one of the many effective YouthBuild programs that helps out-of-school youth ages 16 to 24 obtain their high-school credentials and trains them for a job in construction; Richard Laughlin's Casa Über Alles, a joint program of The Hill Country Builders Association and the Fredericksburg, Texas, High School Advanced Building Trades Class (see photo, top left, page 36).

What we can all do constantly is raise awareness of what construction is really like. What's desperately lacking in every corner of the country is trust in the building trades. Instead, mistrust has been etched into the social fabric and manifests in ugly ways. After every natural disaster, we get every newsroom's favorite trope: stories about contractors scamming consumers. Certainly scams do happen, but they are disproportionately aired and don't accurately represent the majority of builders. We need the trust of school counselors to guide students equally toward college or the building trades; of teachers to integrate building-science and statics into high-school STEM curriculums; of moms and dads to recognize that building can be both fun (first and foremost, but also engaging, meaningful, fulfilling, the list of positive qualities goes on) and lucrative, and to believe it enough to support their children in choosing the best career path, independent of the fear of missing out if their student doesn't get into the right college. And we need the trust of economists and policy makers and industry leaders to recognize how construction productivity can truly be fixed: by investing in building the skills of the construction workforce.

Clayton DeKorne is chief editor of JLC.

The history of successful construction technology is an evolution in building components. Carpenters used to build doors and windows on site. Now we install "units," which requires skill, to be sure, but is considerably faster.

Augustine Sackett's invention of drywall in 1894 trimmed weeks off the construction of a new home compared with nailing up lath (split lath was even slower) and finishing with wet plaster.

Photos, from top: Rick Luck; Historic American Buildings Survey (Library of Congress); Linda Ferguson

A BETTER BRAND OF BENDER.

Introducing Malco's Metal Benders. The latest in a long line of Damn Good Tools.

Metal Benders by Malco® will quickly become your jobsite go-to. Durable, precise and versatile, Malco's modular metal benders are built tough for bending brilliance on metal roofing and details, as well as flashing. These modular bending tools can be customized on the jobsite, allowing you to "freestyle" your set-up in a one or two station configurations to get the job done efficiently.

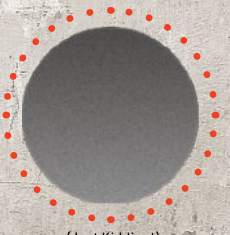
- Form 0-100° bends on straight or curved panels of any length.
- Choose from narrow stance for tighter, more detailed bends, or wide stance for making long, straight bends.
- Easily reconfigured on the job, adjusts for different thicknesses and materials.
- Angled roller eliminates scratches on 90° bends.
- Made with premium CNC aluminum and stainless-steel components.

Malco®

Damn Good Tools.
bendersbymalco.com

THE DECKWISE® HIDDEN DECK FASTENER!

Scratch Here! →



(Just Kidding!)

DeckWise.com
The Ipe Clip® Fastener Company, LLC
Manufacturers of Hidden Deck Fasteners & Accessories

MADE IN THE USA — HIDDEN DECK FASTENERS

It's a hidden deck fastener. You're not supposed to see it.
To see our hidden deck fasteners up close go to www.DeckWise.com.
Let us help you build the deck of your dreams!

Call 866.427.2547 or Chat Online

100 VOC & 250 VOC

LOW VOC!

START STRONG! FiNiSH STRONG!

SEMI-TRANSPARENT HARDWOOD FINISHES

DeckWise.com
The Ipe Clip® Fastener Company, LLC
Manufacturers of Hidden Deck Fasteners & Accessories

Applying the proper finish to any hardwood project, means your choice of brand may make or break the results. So why choose anything other than an industry leading brand with the reputation to back it?

Make the right choice, the WiseChoice™.

For more info call **866.427.2547** or **Chat Online**

Leveraging CAD as a Craftsman

How one carpenter has unleashed "his most powerful tool"

BY PHILIP ARMAND

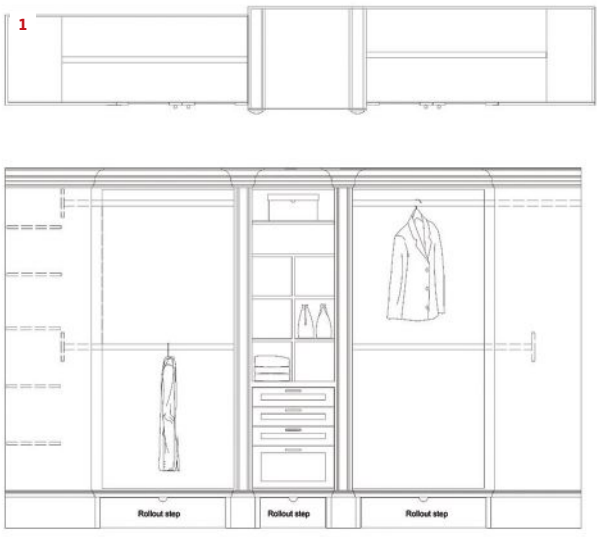
"I can't take the stress, I didn't sign up for all this responsibility." Nearly in tears, my only employee quit.

Three weeks before this meltdown, we were installing a custom home office—the largest project yet of my fledgling business. After 12 months of rapid growth, I needed to subcontract a larger shop to build the cabinets for this luxe waterfront home. The design work was left to us. I conceptualized and he measured and drafted our project—old-school style, with pencil and paper.

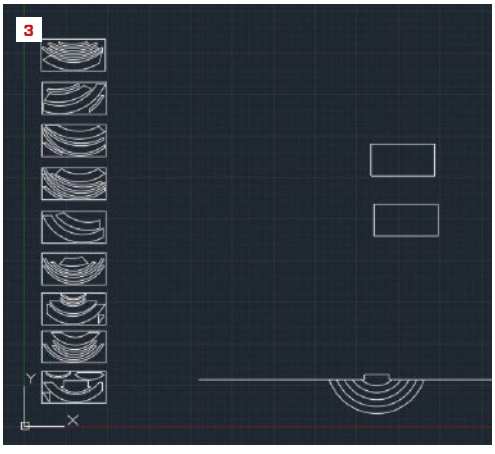
My mid-20s pride was turbocharged as we unloaded the truck; the smell of freshly sprayed lacquer and wood infusing the ocean air. I led the charge in what I was certain would be a massively successful outcome. The morning passed with ease. The base cabinets, a wood desk top, and a custom couch were set. Admiring our work before lunch was a visual appetizer. Next up, the first upper cabinet (a massive, glass-paned storage unit) was carefully hauled into the office. Hmm, it seemed too large for the allotted space. I pulled out a tape measure and sure enough, there was a 12-inch discrepancy in height! In the garage, that same pesky tape measure affirmed that all the upper components were exactly 1 foot taller than the room. The casualties added up: Profit was lost, pride was deflated, my employee quit, and an annoyed client needed to exert patience for another month.

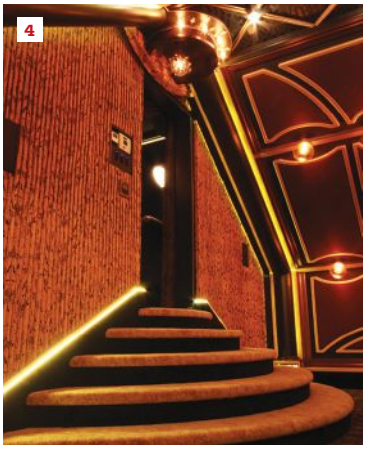
Weeks later, I was sitting in a college classroom learning AutoCad, a computer automated design (CAD) software by Autodesk. That night, I steadfastly practiced, typing commands and attempting to draw something … anything. By week 10, I could use the program proficiently. I had more to learn, but with the basics, I was able to do 90% of the job. As a Luddite with most technology, I needed the pain of

Photos by Philip Armand



For this closet design **(1)**, the clothes and accessories on the shelves were taken from CAD blocks. The author inserted his millwork supplier's molding details into the drawing by downloading the files from the supplier's website, then cut and pasted them into the drawing. The ability to do that allows him to "shop" for trim in a virtual space before a build begins. The client loved the finished closet **(2)**, which was executed exactly as drawn.





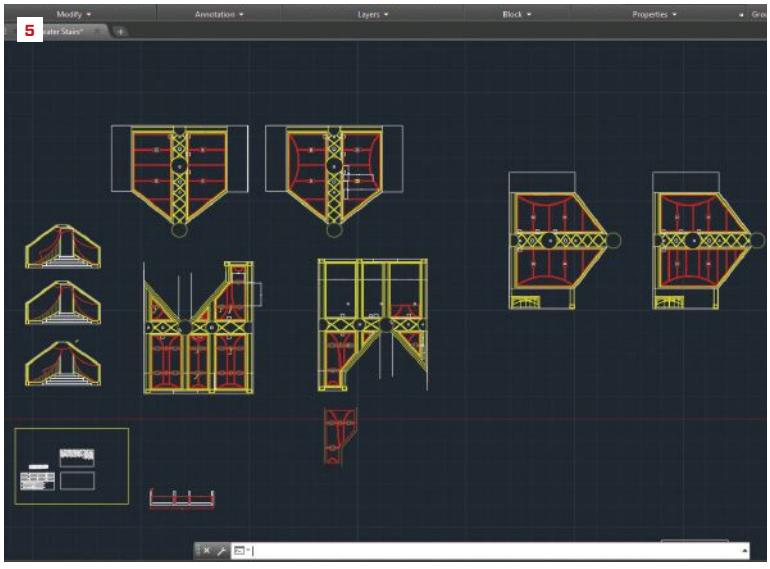
The entry stairs to a home cinema the author was commissioned to design and build are elliptical. After developing them in CAD **(3)**, he broke the stairs into components that fit into 4-by-8-foot rectangles. Each of those files were saved separately and loaded into the CNC machine, then cut out of shop-grade birch plywood. The parts were assembled in a few hours on site. The completed stairs were wrapped in carpet **(4)**.

that waterfront mishap to push me toward a technological evolution.

"Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow," wrote American physicist William Pollard. That has become my anthem. Writing this 23 years after that pride-busting afternoon, I am grateful for the silver lining: CAD has been the single most powerful tool that I've learned to use. With it, I've been able to easily work with clients on their designs, present work to staff and subcontractors, easily make edits, and use CNC (computer numerically controlled) cutting technology.

The details of which design program is best for you can be found elsewhere; there are many software options available along with dozens of online forums to learn about them. In this article, I describe only how a workflow assisted by CAD has impacted my business. I mostly work on residential renovations and my design work is mainly focused on interiors; however, CAD can be used by any trade.

I use AutoCad by Autodesk, which many architects use and most large cabinet and millwork fabricators are familiar with. For the novice, AutoCad may be daunting because there are seemingly endless tools and ways to configure it. The learning curve can be steep if you want to dive deep into the program. I know the basics and stopped my training at the boundaries of my needs—2D line drawings and the occasional 2D isometric (adding depth to a 2D image to represent a 3D look). This still took time, but the investment I made



The author's CAD workspace **(5)** for the home cinema allowed a big canvas that was easy to navigate and manipulate. He mapped the geometry of the room into flat planes inside the CAD workspace, allowing accurate design and panel placement **(6, 7)**. Small components like the decorative light panel **(8)** were hand-designed, and one quadrant was cut out with a jigsaw. Once he had a pattern he liked, he scanned it and sent the file to a graphic designer, who made a properly scaled file in Adobe Illustrator. The author then CNC-cut the panels from 1/4-inch MDF.

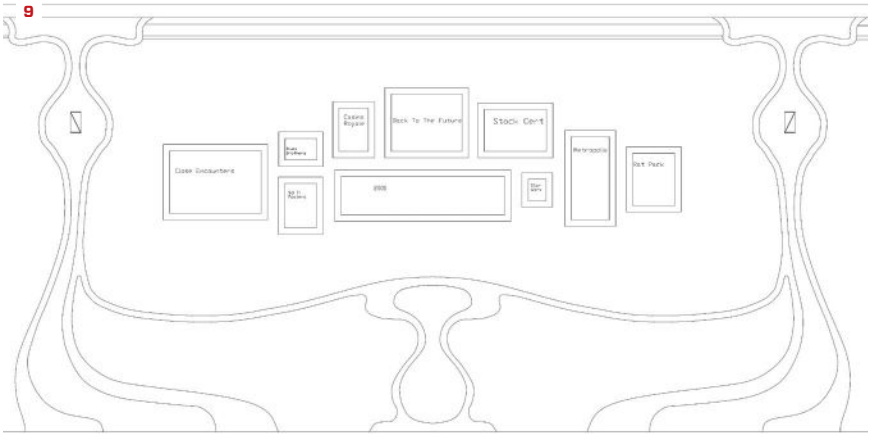
in learning how to use CAD changed the direction of my business. Many of the high-end jobs I have executed could not have been done (or done as easily and impeccably) without automation in design and component cutting.

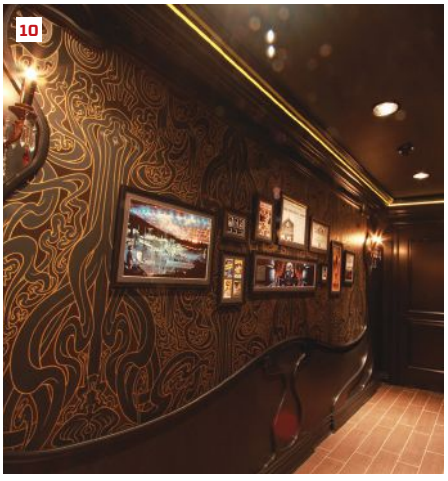
WORKING WITH CLIENTS

A majority of my business has been interior custom cabinetry, millwork, and room design. I no longer have my own shop; I sub out all the cabinet components and handle the design and field-work with my team. I visit the site, interview the clients, gather any inspirational images and samples, measure, and take pictures of the space. Depending on the scale of the work, it can take a few hours to several days to make a drawing. On complex projects, I bring my laptop on site to help more accurately map complicated room geometry or design as I go.

Designs can get very complex, and I may not have the skill or time to handle all of the design work (my ability stops at 2D line drawings). In those cases, I work with graphic designers who are proficient with Adobe Illustrator. Properly scaled CNC files can be created by most design software, including Adobe Illustrator. I also work with a 3D modeling designer if a client wants to see how the completed work will integrate into the space. Most of the time, my clients accept 2D line drawings. However, if I need to present more, I can easily find pros on sites like freelancer.com or fiverr.com to fill the gaps in my skills or schedule.

On several occasions, clients have sat with me to design their





The author used the virtual design-space **(9)** to organize artwork outside the home cinema—a key step to avoid damage to the hand-screened wallpaper. All the delicate wall components were CNC-cut from lightweight MDF **(10)**.

projects. The most recent example involved an extensive master suite closet. The client couldn't easily explain what she wanted. In about 10 hours, I made a basic drawing; then we sat together with a laptop for two hours and completed a final draft she loved. Before the end of that day, my cabinet shop had the files open in AutoCad and was working on pricing.

My millwork suppliers have CAD files for their products, which makes for a smooth workflow in selecting trim and other architectural details for a project. Most large product manufacturers also provide CAD files, so when I am designing a bath vanity or kitchen, I can often insert accurate representations of faucets and appliances into my drawings. If the exact appliance selection has not been made or a file is not readily available, I use "CAD Blocks," files that can be purchased or often downloaded free that provide generic items in endless categories.

Half my time is now spent designing and consulting on residential build/remodel projects. CAD has been critical for visually explaining how a detail could be executed. I often pass along hand-drawn doodles but usually find this insufficient and follow up with CAD drawings. Granular visual explanations often need a crispness and formality to make them acceptable to clients.

WORKING WITH CREW AND SUBCONTRACTORS

My busiest period saw me managing six finish carpenters on a massive interior trim project. I set up a laptop and printer on site. Every morning, I made shop drawings for my staff. I easily assigned teams to different aspects of the project by handing out drawings and having short conversations. This saved me from the concentration and distraction of constant supervision, allowing me to put my toolbelt on and get dirty.

Drawings were leveraged to CNC-cut components. There were several elliptical arches and complex oval trim details. My CNC vendor cut components, and my millwork vendor CNC-carved oval and arched window trims to match the selected molding profiles.

It has been easy to work with my preferred cabinet shop and steel fabricator, as both work with AutoCad and can open my files. This carries over into expediency of quoting, editing, and finalizing a project. CAD has saved me hundreds of trips to their shops and increased accuracy dramatically.

Structural aspects of a project are often not fully detailed in the blueprints—there is always some bracket or component that needs to be figured out and fabricated. CAD has been a great way to render and send a component design to an architect or engineer for review. On a recent renovation, a cluster of four large, steel I-beams converged in the middle of an open floor plan. The prints had no spec for that detail, the fabricator did not want to engineer the connection, and the engineer was not responsive. In two hours, I made a sketch of what I assumed (from experience) would work and sent it to the beam vendor's engineer for review. He made revisions and production began shortly after; the engineering logjam just needed a lever.

MAKING EDITS

The power of CAD is the ability to make quick edits. In a file, I can create several versions of a concept, copy and paste sections, and do alterations all within view of the original idea. Then I can easily share my idea with a client, vendor, or collaborator. On a home cinema, I worked with a design collaborator who was also proficient in CAD. All my details were up to snuff until I designed the hallway. My first draft was my favorite—she disagreed. I attempted several variations until she took my file and made several alterations. We ping-ponged the file back and forth, finally settling on the original drawing with a few adjustments.

Sometimes a design is not clear or not possible to fabricate as drawn. My cabinet vendor always makes shop drawings before a

On this job **(11)**, the author produced shop drawings every morning for his staff. He assigned teams to different aspects of the project by handing out detailed drawings and having short conversations. His time in CAD sped up the process, front-loading decision-making in a virtual space, speeding up production, and removing decision fatigue from the carpenters. There were several elliptical arches and complex oval trim details. The CAD drawing (inset) is the CNC file used to cut the arched panel and arched framing.

build begins and sends me revised files for approval. This is a quick way to fail-safe a possible installation debacle and has made our installation process nearly flawless.

My personal strength is in the edit. The first drafts are just a way to gain momentum and get ideas out of my head. I then Frankenstein aspects of my early drafts into a final drawing (without unsightly stitches). Confirming and adjusting the technical feasibility of a building component, architectural detail, or component with a vendor or expert has been easier with CAD. If CAD isn't available at the other end, I make a PDF file or print a copy. Visually asking questions has removed ambiguity and costly re-dos.

LEVERAGING CNC TECHNOLOGY

A close relationship with a cabinet shop has made the process of cutting components simple. The shop's owner trained me in programming and basic operation of his CNC machine, and now charges me $150 per hour to use it. I need occasional assistance, but once running, I can upload and run my files through the machine to fully cut components. I use other local vendors for plasma and waterjet CNC cutting if I need metal or stone components cut. The technology is widespread and most medium to large cabinet shops have a CNC machine. In my area, there are also several CNC service providers that strictly cut components for clients. Hourly fees vary.

Making CNC-ready files has its own parameters. The shop I use gave me a 10-minute lesson on cleaning up any duplicate lines (newer versions of CAD have a "Delete Duplicate Objects" tool) and making all my objects into "Polylines," where each item I want cut is one contiguous object to the software. I save my files in a CAD version compatible with the shop's current CAD software. This is simply done in the "Save As" menu, where I can select from 16 different versions of CAD. I save the files on a USB drive, then upload them at the shop to its CAD software for review and output to the CNC software for processing. The software checks the file for errors, and then we program the cutting direction, start point of each cut, how fast the machine will cut, and in how many passes.

CNC technology was invented more 60 years ago; today, it's easily accessible and reasonably priced and even a hand-held CNC router is available. Using this technology to up-level a business seems inevitable. The next generation will easily embrace automation—the young ones are cable-ready, 3D-printing technophiles; my exact opposite. As Stewart Brand wrote: "Once a new technology rolls over you, if you're not part of the steamroller, you're part of the road."

I have distinguished my business from other designers and millwork installers by implementing technology to publish my imagination into reality. CAD has also given me courage to attempt complex and large-scale work, knowing I can fabricate complex geometric parts and scale them with ease. If I can imagine it, I can draw it and make it real. It has made my presentation and work look grander to clients than the reality of my being a guy who operates his small business from a Ford pickup and a home office.

Coming full circle, my infamous 12-inch discrepancy has been forgiven and, hopefully, forgotten. The client was eventually satisfied with properly sized cabinets in his home office. Since then, I have designed nearly a dozen rooms, a cabana, and several architectural details for him and his brother. Knowing how to use CAD wouldn't have prevented that debacle; I still need to be impeccable at field measuring and documentation. But CAD virtualizes a project, making a space and idea portable and allowing me to communicate and collaborate with ease. Simply put, CAD is a tool to bridge creativity and reality.

Philip Armand is a craftsman, designer, and general contractor serving Eastern Long Island, N.Y.

techno Metal Post™

WORLD LEADER IN HELICAL PILES

DO YOURSELF A FAVOR, USE TECHNO METAL POST FOR YOUR ADDITION FOOTINGS

- AFFORDABLE AND EFFICIENT
- NO EXCAVATION AND LOW FOOTPRINT
- EASY ACCESS EVEN IN TIGHT SPACES
- SIMPLE AND QUICK
- CODE COMPLIANT
- WARRANTY

Techno Metal Post helical piles are engineered and guaranteed.

CERTIFIED ISO 9001 CERTIFIED

IAPMO ES®
IAPMO UES ER-481

ICC ES®
AC 358 Approved
ESR-3418

info@technometalpost.com | technometalpost.com

BY VINCENT SALANDRO

1. Soft-Close Door Hardware
Compatible with the company's 200 Series I-Beam Track sets, Johnson Hardware's 2066 Soft-Close Kit can support sliding doors weighing up to 330 pounds. When the hardware is used in single-direction, soft-operation pocket-door installations, doors must be at least 24 inches wide. For bi-directional installations, two kits are required and doors must be at least 32 inches wide. Each kit, available for $74, includes an actuator arm, dampener, track stop-block, adjustment wrench, and steel connection pin. johnsonhardware.com

2. Rain and Drainage Solution
Zip System Rainscreen from Huber Engineered Woods meets code requirements for a 3/16-inch drainage space behind stucco and adhered stone assemblies to enable them to dry out. The rainscreen consists of a rigid drainage mat covered by a heavy-duty fabric that's approved as a secondary water-resistive barrier; Huber says combining the high compression strength of the 1/4-inch drainage mat with the 5-to-7-perm WRB promotes durability and effective moisture management. huberwood.com

3. Low-Profile Glass Wall System
On the interior, wood with a contemporary profile of just over 2 inches frames expansive walls of glass in Sierra Pacific Windows' TimberLite 2.0 Wall System. Concealed fasteners maintain a clean look inside, and with the system's GroundLine feature, the glass dies into the floor with no bottom mullion. Exteriors sport heavy-duty powder-coated aluminum. The system can incorporate the company's aluminum-clad wood doors and structural corner units. sierrapacificwindows.com

4. Conformable Flashing Tape
Designed for sealing dynamic joints, sheathing joints, substrate transitions, penetrations, and rough openings, self-adhered StoGuard Conformable Membrane doesn't require priming on most substrates and installs at temperatures as low as 20°F, according to StoCorp. The flashing tape meets AAMA 711-13 window-flashing and ICC-ES AC212 sheathing-joint requirements. stocorp.com

5. Continuous Insulation Wood Fiber Board
Made from softwood fiber, PMDI adhesive, and paraffin, TimberBoard from TimberHP reportedly provides a stable R-3.4 to R-3.75 per inch as above-grade continuous insulation for walls and roofs. According to the manufacturer, the vapor-permeable, nontoxic board allows indoor humidity to escape and balances temperature swings in conditioned spaces to reduce heating and cooling loads. The rigidity of the panels reportedly makes them easy to handle and cut. Available with square or tongue-and-groove edges, the single-ply panels range in thickness from 1 inch to 9 1/4 inches. timberhp.com

6. Whole-House Tankless Water Heater
Combining energy savings with a streamlined, lightweight configuration, Bosch Thermotechnology Tronic 6100C electric tankless water heaters are suitable for whole-house applications. The 13 1/4-inch-by-20 1/4-inch units employ modulating elements that help ensure a constant output temperature and help deliver 95% efficiency with no stand-by loss, Bosch says. We found a 27-kw model online for $750. bosch-thermotechnology.com

7. Wood-Mimicking Vinyl Siding
Mastic EverPlank luxury vinyl siding from Cornerstone Building Brands has a wood-grain texture and an insulated foam backing that provides wood-like rigidity. No caulking is required for installation; panels butt together using a bonding plate and custom-formulated adhesive, leaving no gap or overlap at the seams. The siding is available in 6-inch-by-12-foot boards. cornerstonebuildingbrands.com

8. Self-Adhering Roofing Underlayment
Petersen's Pac-Clad HT high-temperature, self-adhering roofing underlayment helps provide protection against water damage from ice damming and wind-driven rain. The manufacturer says the 40-mil, skid-resistant, high-tensile-strength rubberized asphalt membrane, which is laminated to an impermeable polyethylene film layer, can withstand temperatures up to 250°F and will not crack, dry out, or become brittle. A split-release film eases installation. The underlayment comes in either black (60-day exposure) or white (180-day exposure). pac-clad.com

9

10

11

12

9. Panelized Faux Stone Siding

Qora Cladding aims to replicate the appearance of stacked stone with narrow joints in its Ashlar Drystack fiber-reinforced-polymer siding panels. The cladding is manufactured using a combined rigid foam core and fiberglass-reinforced compound surface with stone particles, resulting in lightweight, easy-to-install panels. The manufacturer says the 48-inch-by-18-inch panels help inhibit sound and resist impacts and fading. qoracladding.com

10. Cold-Weather Lap Tape

CertainTeed's Arctic Edge Flintlastic SA Cold Lap Tape is designed to help adhere Flintlastic SA membrane in temperatures between 35°F and 49°F in low-slope residential and commercial applications. Installers use either a hand-held or stand-up applicator to affix the tape to the substrate at critical interfaces, including perimeter details, side laps, and base/interply end laps. A release film peels away so the overlying membrane can then be adhered to the tape. On metal substrates, the tape can replace primers. According to the manufacturer's installation instructions, the tape itself should be stored in temperatures above 50°F and never used cold. certainteed.com

11. Full-View Hinged Patio Doors

Weather Shield's Vue Collection Hinged Patio Doors can be hinged to swing to the inside or outside and are available in customizable heights up to 12 feet. The all-aluminum door frames have modern, square profiles in keeping with the Vue aesthetic and feature a stainless steel, multipoint lock system that secures the door panel in five places; an optional lock box that mimics the look of a steel door is available. weathershield.com

12. Triple-Insulated Glass

Through a collaboration with Corning, PGT Innovations developed Corning Architectural Technical Glass, a new, lightweight glass used in the manufacturer's Thin Triple Insulated Glass Unit (IGU). Each IGU comprises two outer panes of traditional glass with an internal pane of the new, ultra-thin glass. The manufacturer says the IGU aligns with new energy and efficiency values under the Inflation Reduction Act and Energy Star Version 7 guidelines. pgtinnovations.com

Meet the MudMixer

BY JAKE LEWANDOWSKI

About a year ago, we received a poor batch of ready-mix concrete. Fortunately, we had taken several cylinder samples. We did end up exceeding our concrete design specification, but the concrete took longer than we had expected to cure, which resulted in scheduling consequences. Still, it could have been much worse. What would have happened if we prematurely loaded footings that had not reached their designed specification? What if the concrete never hit the required psi? Who's at fault and who would be blamed?

What I learned from this experience is that it is critical to document everything about the concrete for a project—namely, the product type used, how it is mixed, and the water-to-cement ratio, plus a few other things, especially if you're using additives. When you modify a bagged mix by adding portland cement or a water reducer, do you now own that mix design? Are you charging your client accordingly for the additional liability you are taking on by modifying bagged goods? Before answering such questions for your organization, you need a consistent means of mixing concrete; otherwise, all the specs you document may be rendered unreliable.

CONCRETE MIXERS

For us, it is important to have a mixer that is mobile and that's electric. A substantial amount of our work, whether residential, industrial, or commercial, is indoor work, which has its own challenges. We need to be able to transport the unit to the work location, which may be down a flight of stairs, up a loading dock, or the like. We need to manage indoor air quality, and sometimes we need to manage sound.

There are some awesome, extremely heavy-duty gas options, and one of those might be the best mixer for you, depending on what you do. For us, however, the gas models lack many of the attributes we're looking for in a mixer. Small, portable drum mixers had been our best option, though they're certainly not perfect. In my opinion, they're disposable. They've always lacked the power needed to mix concrete at a profitable speed. You can't easily and accurately regulate how much water you are adding, without an extra labor cost for measuring out the water for each batch. If a conscientious amount of care isn't taken to break open and dump each bag into the drum, drum mixers can produce a troubling amount of dust. Not to mention they can be tough and time-consuming to clean, and you're left with a ton of cement-laden water to dispose of. When you add in the frequency of mechanical failures, it often ends up being easier to use a wheelbarrow and a shovel.

MEET THE MUDMIXER

The MudMixer is an on-site concrete mixer made by a small, Texas-based company of the same name. We've been using one

The MudMixer is a highly portable machine that is designed to mix and dispense fresh concrete at the site of each pour—in this case, each new column footing for a new basement beam **(1)**. At 145 pounds, the unit can be easily loaded and unloaded by two workers **(2)**.

Photos by Jake Lewandowski

for almost a year, first renting one, and then, about six months ago, buying one, and so far it has been an absolute game changer. The MudMixer is similar to a volumetric concrete mixer except that the water is added and the concrete is mixed in the chute, making it different from any other electric mixer on the market. Weighing in at only 145 pounds, it's extremely mobile, as well as easy for two people to load on the truck and unload at the end of the day. Virtually the whole machine is made from 14-gauge steel that is powder-coated gray; it seems extremely robust and heavy-duty.

MudMixer claims to be able to mix 40 bags per hour, and we have verified that. This makes mixing a whole pallet of 80-pound bags of concrete an hour-or-so project. The MudMixer has a big splitter that runs down the center of the hopper that practically automates opening bagged material. When it comes to adding water, we run a garden hose to the mixer. A valve lets us control the precise amount of water saturating our mix, giving us consistent and uniform results. Cleaning is easy, too—it has an onboard hose—and only takes a few minutes. Typically, we are left with less than a full bucket of gray water.

Dust generated from bagged goods is still very much an issue but not any worse than what we are already accustomed to. MudMixer is a professional-grade tool, made to withstand the rigors of the jobsite, and it comes with a price tag to match: $3,000. If you mix 20, 30, 40, or more pallets of concrete a year, though, it's going to be a no-brainer; this tool will pay for itself quickly. Stay tuned for our 100,000-bag, long-term review, when we are going to report whether this mixer is as durable and maintenance free as the manufacturer claims.

Jake Lewandowski is a construction manager for Great Lakes Builders serving Greater Chicago.

The mixing is done by an auger running the length of the narrow, horizontal chute **(3)**.

A 75-Degree Swing Table for Cutting Acute Bevels

BY JOHN CARROLL

The Big Foot 10 1/4-inch beam saw is a high-quality tool hand-built in the U.S. around the same proven motor housing that powers the classic Skilsaw Model 77 wormdrive saw. It's got plenty of power, and for such a large saw, it is fairly light (just under 16 pounds), has great balance, and runs smoothly. That's all good, but the game changer for me has been the Big Foot swing table, an optional accessory designed specifically for this saw.

With a 3 7/8-inch cutting depth at 90 degrees, the saw can cut nominal 4-inch lumber in a single pass, ideal for cutting posts and beams and making it a great asset for fencing contractors, deck builders, timber framers, and others who cut a lot of posts and heavy timbers. Production framers like Tim Uhler, who reviewed the Big Foot saw for *Tools of the Trade* in 2016, live and die by productivity; that's why they like it, too. Although they don't cut as many 4-by timbers as those other specialized contractors, they're always looking for ways to shave a few minutes off every task. They can stack their wall plates, for example, and cut two at a time with the Big Foot saw.

I don't live in the same world as those specialized contractors. I build additions and remodel existing spaces, typically working on houses that are 50 to 100 years old and sit on narrow, urban lots. In tying into and refurbishing old houses, I run into one problem after another. Usually, the house is neither level nor square. I often find rotten wood and termites. As I work, I have to protect the interior of the house from rain and keep the occupants of the house safe and as comfortable as possible.

Because of these and other challenges, my jobs usually proceed in fits and starts. I've learned to take the bitter with the sweet, however, and grind through the problems as they crop up. Steady progress, not blazing speed, is my goal, and I buy tools that solve problems and maintain a high level of quality. In my world, the ability to cut the occasional post in one pass rather than two does not loom large.

For that reason, I never felt the urge to buy a beam saw. All that changed, however, when I saw that the

Big Foot beam saw could be fitted with a swing table that adjusts to a 75-degree bevel and can cut nominal 2-inch-thick lumber at 67 1/2 degrees. No other saw that I know of has these capacities.

This ability to cut very acute angles might seem to be an exotic feature, but I've found it to be extremely useful at key points during my jobs. I use it to do things like make the bevel crosscuts needed for the level and inclined plates used when framing a gable-end wall. On a 6-in-12 pitch, those cuts would need to be 63 1/2 degrees. I also use it to make the compound miter/bevel cut needed for an octagonal roof. At the tops of the hip rafters, the saw would have to be set to 67 1/2 degrees for those cuts. I also use it to rip the bevel along the length of the sleeper in a blind valley. On the one shown here, I ripped the sleeper at 61 degrees.

The Big Foot beam saw with the swing table is not a tool I use every day. When I need to cut acute angles in nominal 2-inch lumber, though, it solves the problem and moves my job forward.

The swing table fits only on Big Foot beam saws. If you already own a Big Foot saw, you can buy just the swing table for about $150 and change out the table. Replacing the original magnesium table that comes with the beam saw with the steel swing table is a simple job that takes about 10 minutes. If you're starting from scratch, you have to buy both the Big Foot saw, which goes for $330, and the swing table for a total expenditure of $480. bigfootsaws.com

John Carroll, author of Working Alone, *is a builder who lives and works in Durham, N.C.*

The Big Foot 10 1/4-inch beam saw can be retrofitted with a powder-coated-steel swing table that adjusts to a 75-degree bevel with a 1 1/8-inch depth of cut **(1)**. Here, the author demonstrates how the swing table allows him to rip a 61-degree bevel for the sleeper in a blind valley for a roof that he is framing **(2, 3)**. The swing table allows the saw to make beveled crosscuts such as the 63 1/2-degree cut needed to frame this gable-end wall **(4, 5)**.

Photos: Matthew Narvey

High-Powered Jobsite Lighting

BY TIM UHLER

Winter is never a season I look forward to working in. Besides colder temperatures, we have less daylight—a lot less, depending on where you live. I frame and side in the Pacific Northwest, and on January 23, when I wrote this review, we started work at 6:30 a.m., and the sun didn't rise until 7:57 a.m.; then, it set at 4:35 p.m. Days like that are when temporary jobsite lighting becomes a fact of life, and it always seems like there isn't enough.

For several years, our go-to jobsite lighting has been supplied by various iterations of Milwaukee's battery-powered M18 LED floor and stand lighting, which I've periodically reviewed for *JLC* since 2016. When I learned about Milwaukee's new MX Fuel Rocket Tower light/charger, which is designed more for commercial sites, I asked the company to send one to compare with our existing lighting. On its brightest setting, it offers an eye-popping 27,000 lumens, compared with the 9,000 lumens offered by the M18 Radius site light (see "Smart Work Lights," Jan/20).

Part of Milwaukee's MX cordless equipment line, the Rocket Tower is the mother of all battery-powered lights. In addition to providing up to 27,000 lumens of illumination, the lights extend as high as 10 feet tall, with outriggers to stabilize the unit on uneven surfaces. It collapses to a 44-inch height, making it pretty easy for one person to wheel around, though lifting the 108-pound unit in and out of the van is easier with two. With an IP56 rating, the Rocket Tower can withstand airborne dust and windblown rain, and it features Milwaukee's One Key tracking for security.

The unit has four adjustable heads that can be rotated and pointed where you want. Milwaukee claims that the LEDs will never need to be replaced and backs up this claim with a limited lifetime guarantee. While the light can run off battery power, it can also be plugged into a regular 110-volt circuit.

In use, we found it charges quickly. When working outside, we'd typically turn it on when we first arrived at a jobsite and turn it off once there was enough daylight, and we needed to recharge it only about once a week. When working inside, we would plug it into a wall outlet first thing in the morning to have light all day at full brightness while topping off the battery. According to Milwaukee, the battery will last three hours at full brightness, which under battery power is 20,000 lumens. You get the full 27,000 lumens only when the unit is plugged into A/C power.

The MX Rocket Tower comes with a hefty $3,300 price tag. While that's not a small sum to spend on jobsite lighting, we've found that it's been invaluable to the way we work, allowing us to start early and stay late if needed. Because it is faster to set up and take down than all of our other lights, it has largely replaced them. For example, the light is great for siding work, because we can illuminate an entire wall. Another example is the driveways for a pair of spec homes we are building, which we had been putting off because of rain. Finally, after waiting two months for a nice day, we lined up our flatwork sub and concrete for one of the driveways, which they finished by 11 a.m. Because we had lighting, I was able to get another delivery of concrete, and our sub and his crew stayed and poured the second driveway, placing 50 yards of concrete in one long day. This allowed us to schedule the final inspections and list the homes for sale that week. To me, that more than justifies the expense, not to mention the extra safety that good lighting provides on a jobsite.

Lighting has come along way since I reviewed our set of metal halide Wobble lights back in 2014. Good jobsite lighting isn't cheap, but it's a necessity, so buy the brightest and most convenient lighting you can. Remember to include tools as a line item on your job budgets and make sure you account for them come tax time. It takes the right tools to do our job and do it well, so don't cheap out on lights. milwaukeetool.com

Tim Uhler is a lead carpenter for Pioneer Builders in Port Orchard, Wash., and a contributing editor to JLC.

The Milwaukee MX Fuel Rocket Tower light extends to 10 feet **(1)** and puts out as much as 27,000 lumens, enough to fully illuminate the side of a house or a cavernous workspace **(2, 3)**.

Photos: Tim Uhler

BY T JEFF SPENCER

The Slate Valley

I own and operate a small roofing company, Stewardship Slate, that specializes in the restoration and repair of slate roofs. We work primarily in the downtown area of Burlington, Vt., where more than half of the houses are roofed with slate—slate that was most likely quarried from a nearby region known as the Slate Valley. Running approximately 24 miles along the Vermont-New York border, this area has been and continues to be one of the largest sources of roofing slate in the U.S. (see map, bottom right).

Slate Valley slate is found in a variety of colors, shades, and textures. Green, sea green, gray, red, purple, and black slate come from this area, as well as slate in variegated mixes of these colors. This slate has a reputation of being among the best in the world and is highly durable, lasting as long as 200 years. For our restoration work, we typically use salvaged slate from a couple of family-run slate companies located in the heart of the valley. The weathered salvage slates are a better color match and thickness (they are thinner than today's standard) for the roofs we work on, which are almost all at least a century old (see photo, top right).

I grew up in a town just north of Slate Valley and always had a passing awareness of it—my closest exposure came from playing high school soccer against the Fair Haven, Vt., "Slaters" and traveling through the area to visit family. Little did I know that this region would factor heavily into my professional life so many years later.

The roof slate industry along the Vermont-New York border began in earnest in the mid-1800s. According to the Slate Valley Museum (slatevalleymuseum.org) in Granville, N.Y., "In 1839, slate deposits were discovered near Fair Haven, but quarrying was found impractical and uses for slate were limited. By the mid-1840s, things began to change, and a strong future for the industry looked promising. The roof of a barn one mile south of Fair Haven was the first to be covered with slate in 1848. It was feared the barn would not withstand the weight of the stone. The barn is still standing today and the same slate roof is intact."

All labor was done by hand in the early days. Workers armed with hand shovels filled large, oak-plank boxes to move material. Steam power came to the valley a couple of decades later, then electric power in 1913 (both power sources helped ferry cut slate and waste pieces around the quarries with less toil). Eventually, air-powered tools such as jackhammers arrived and increased production many times over that of the early, punishing days of slate quarrying. Today, the industry employs modern heavy equipment and adheres to strict safety protocols, though slate blocks are still split into roof slates with hammer and chisel, the one remaining task done by hand.

T Jeff Spencer owns and operates Stewardship Slate, a slate roof restoration company, in Burlington, Vt.

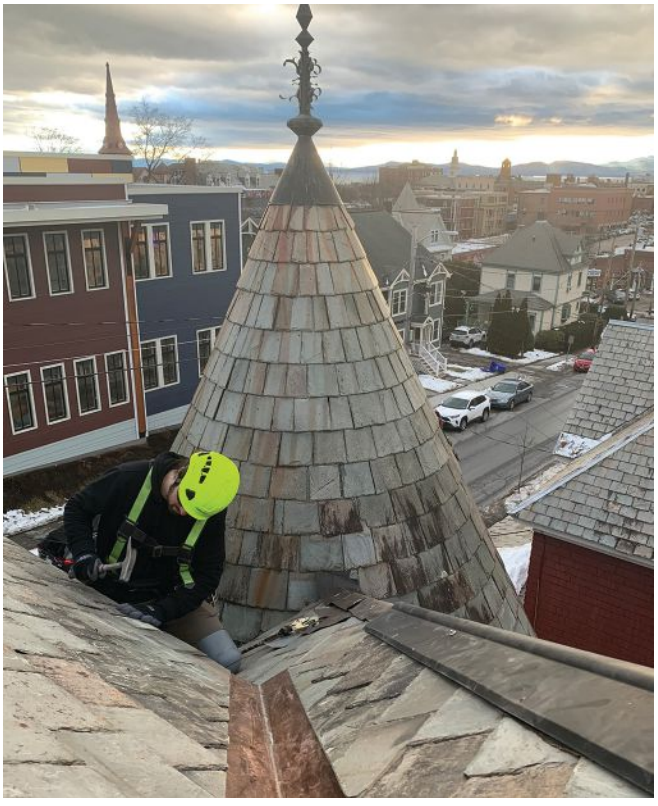
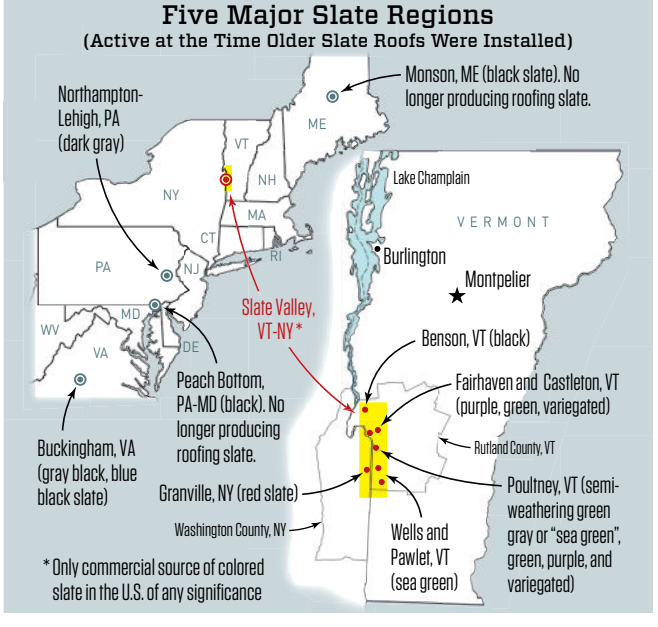
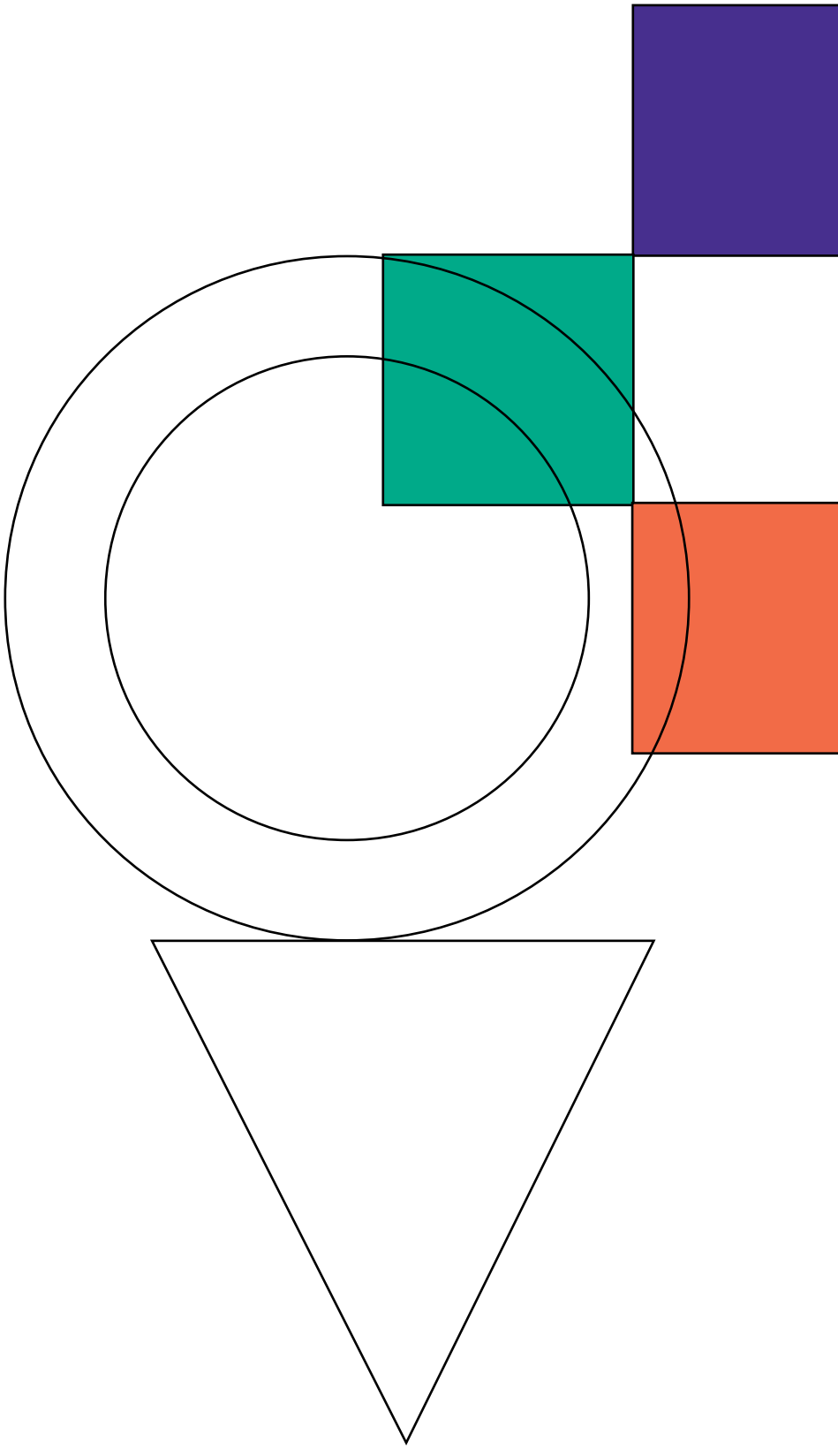


Photo by Michael Dillon; illustration by Tim Healey, adapted from *The Slate Roof Bible* by Joseph Jenkins



JLC



JLC Update

the source for information to help pros improve job performance—including hands-on job tips about the best materials and techniques, industry news and product trends.

Sign up now
jlconline.com

Zonda Media

"Ecoview supports its network of dealerships with an unsurpassed lead generation program, expert sales training, homeowner financing, installation training, a nationally recognized brand, exclusive territory, and much more. Almost anyone can learn our proven system. We will show you how you can start with a reasonably small investment to grow your business to any size you desire."

NOW IS THE TIME TO START YOUR OWN ECOVIEW WINDOWS BUSINESS

BENEFITS INCLUDE:

- Outstanding Retail Presence
- Expert Sales Training
- Professional Web Presence
- Deeply Discounted Factory Direct Pricing
- Zero Franchise or Royalty Fees
- Nationally Recognized Company
- World-class Homeowner Financing
- Ongoing Training & Support
- Business Management Software
- National Healthcare Program with BCBS
- Plus Much More!

EcoView WINDOWS & DOORS

To find out if your market is still available call 1.855.621.1616 or visit ecoviewwindows.com and select "Become a Dealer"