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The Journal of Light Construction

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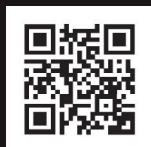


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ON THE COVER: Toby Bonilla of Great Lakes Builders near Chicago fine-tunes the cut on an existing beam while repairing structural damage caused by a vehicle strike. Photo by Jake Lewandowski. See the story on page 40.

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Building the future of housing.

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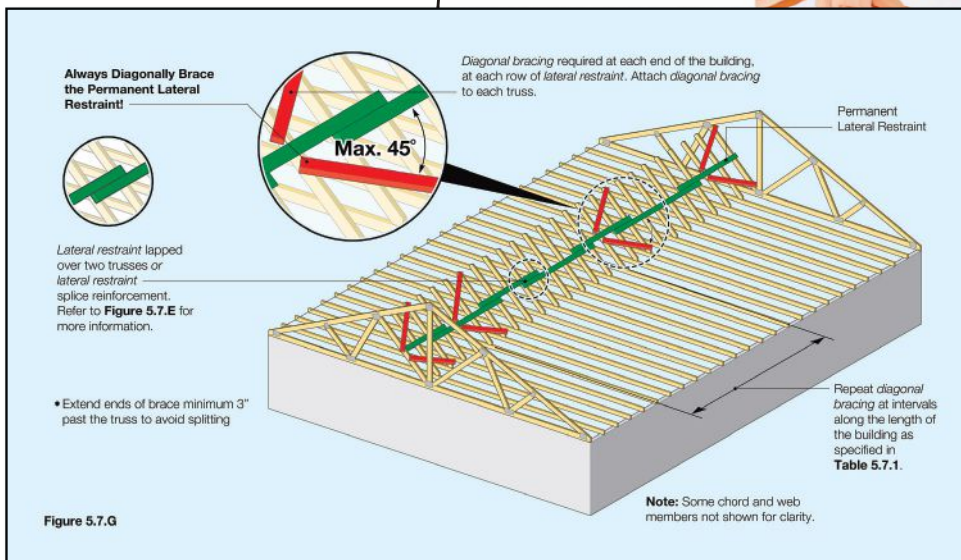
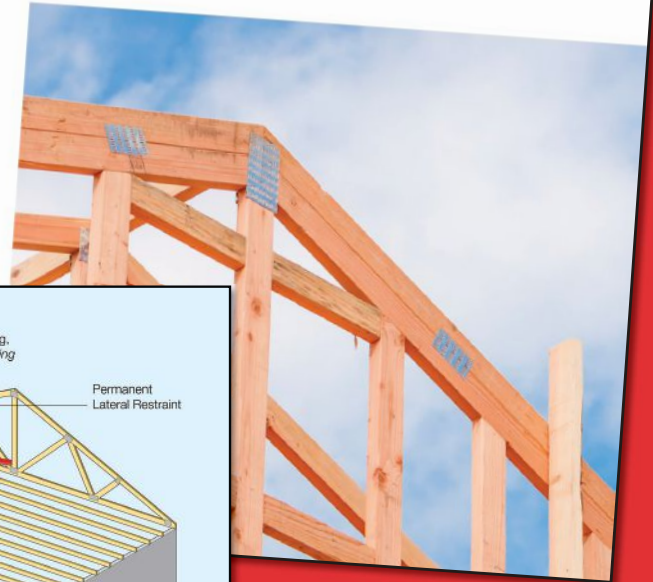
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Jobsite Efficiency

by MARK CLEMENT AND MARC FORGET

Most tradespeople I have met, and all true professional ones, are always looking for ways to get better at their job, whether “better” means tighter joints, more resilient structures, or finer finishes. We search out and share techniques and test what performs best. Coping a perfect joint in crown molding and producing consistent, sound, and straight walls are fantastic goals, but if those tasks take you twice as long as they should or create undo stress on you and those you work with, you will not have a successful career. While the work or product you provide must be good, how you get there must also keep improving. That “how” is the efficiency in performing the task.

When I was putting together ideas for this article, I reached out to contributing editor Mark Clement to compare thoughts and share techniques that have worked for us over the years. One of his first points was that “efficiency” isn’t a result so much as it is a goal or a mindset. Precise layouts, tiles with no lippage, smooth and flat walls: These are results based on acquired skill. Efficiency is a look at the overall process of the work and what things you could be doing better.

Efficiency is usually measured in terms of time on task, but it is also a feeling. When a process is efficient, it is smoother, and you expend less mental and physical effort to complete the task. Creating this efficiency mindset can start with adopting small improvements that you then build on. The goal is to shed the unnecessary in your workflow so you can focus on the task.

Trash Can

Mark. A person’s relationship with trash and debris can be telling. Ask any building inspector and they’ll tell you that when a jobsite looks like a bomb went off, they’re extra vigilant for hijinks and missing pieces. Having a trash can at the workstation and using it is a first, small step. If I must clear a Stonehenge of scraps off the table or saw, I am not making progress, I am just moving stuff around. That is wasted effort.

Marc. When I set up my work area, I set up the garbage bag right there with it. Start as you mean to carry on. Throw scrap out immediately after cutting, all in the same motion. Clean up throughout the day, not just at the end. Clearing off a place to work is unnecessary mental and physical effort that not only takes time but also distracts me from what I am doing. Thinking about trash is not on task, so not dealing with a mess in my workspace is a start to reducing distractions. For me, a messy jobsite causes stress. I feel out of sorts and have a harder time focusing. Distraction wastes time and wears me down mentally.

If you set up your space so you can throw out trash effortlessly as you generate it, you’ll stay on task and save time cleaning later.

Vehicle and Storage

Mark. After my job evolved from carrying materials to mostly carrying tools, I worked out of a minivan for many years. Before that, I had trucks with different sliding beds and drawers. So,



This bin, a yard-bag insert inside a garbage bag, stores flat and takes up little space (above).

whether you have a truck, van, or some combination with a trailer will depend on what kind of work you do.

The important thing is that you configure your mobile workshop so that you can set up and tear down quickly. Tools and materials must be safe from breakage and easy to access. In my van, I built a set of shelves, hooks, and cubbies that kept all my equipment in designated spots at easy reach. At the end of the day, if a spot was empty, I knew what was missing just by sight.

I also labeled everything. Dry-wall trowels are in the bin marked

PHOTOS BY MARK CLEMENT AND MARC FORGET



Tools are easy to access and in designated places for organization (top). Labels save time and make easy reference for everyone on the job (above).

“drywall.” Trim nails? In the case marked “Nails.” I didn’t need to think about where something was and spend time looking for it. No wasted thought, just execution. Those limits on the number of decisions I needed to make during a day added up and freed me to get on with the work.

Labeling the bins also made life easy for anyone working with me. They may not have known where to find the 3-inch screws, but if I sent them to the van to grab the

case marked “Screws,” they would probably be successful. By spending time to set up these bins, labels, and groupings of tools, I saved myself and my partners time and protected my equipment investments from being misplaced or damaged.

Mark. This debate on vehicle type is endless. The only right answer is what works for you. The way to get that answer is to explore all the options and not default to an Econoline or pickup because that is what your boss or the other guys in the crew have.

For me, the best fit is a box truck. It’s a store on wheels. Everything I need is in it, dry and organized, and I have room to move around. The time I save from not having to go to the storage unit or dig around in the shop looking for something is significant. If you are rummaging around bent over in a pickup or looking through a pile in the back of a van, that is time and money lost. I built shelves and a small workstation in my truck so I can turn around to see my equipment or supplies, grab what I need, and get moving.

Battery Management

Marc. Several years ago, this could have been a section on cord management, but now we live by battery power for our tools. For me, this topic also ties in with the earlier section about keeping tools and materials in their designated places, organized and ready. I reviewed my battery box in the article “DeWalt ToughSystem 2.0 20-Volt Charger” in the November/December 2024 issue. Your tools may be a different brand, but the idea is that you need to manage those batteries. They need to be charged, or you can’t work right away, and they have to be protected from the environment and from loss. By having a designated bag, box, or some sort of case, you can accomplish all of that.

The charger is with or part of the set. If you don’t need to hunt through different cases to find the charged

battery or the right size, time is saved. They are in one spot and ready. In my setup, the box is full, so if there is an empty slot, I can see what I am missing. I put my initials on the batteries so they don’t get mixed up with my partners’ batteries. Batteries that I have just used go straight on charge, and I made a habit of checking at lunch to see if I need to rotate any.

Efficiency gain is small habits created and repeated. If you can create that



At the end of day, if Marc does not have time to charge a used battery, he flips its indicator down to show it needs charging first (top). One charger for multiple batteries reduces set-up and tear-down time. Small changes save time and effort (above).

mindset with something small like taking care of your batteries, you can apply that same mindset to other processes.

Mark. I am frugal. This can cause pinch points and blind spots. Why would I buy a multiport charger when my tool set comes with a charger?

The answer is the hydra of charger bodies and cords and the space they take up. Untangling cords at the start and end of day was frustration I didn't need. Then there's the charger cluster on site that always seemed to get in my way. With the amount of deck building I do, I go through batteries fast. Being able to charge multiple batteries at once, in one organized spot, saves stress. One charger with one box of batteries also means one trip to the truck—again, time saved. It may be small stuff efficiency-wise, but it's part of building a mindset of finding ways to do things better.

The Tool Pouch

Mark. I know, I know, it's uncomfortable. But is it though? Or do you have a lousy pouch or, worse, an expensive one, and it doesn't fit or flex? Or do you have a hardware store's worth of stuff in there that you simply don't need?

My rig is two McGuire-Nicholas leather side bags and a Dickies nylon belt. On their own, they can get uncomfortable. The solution for me is wearing a set of Perry suspenders. They carry just enough nail-bag sag, they move when I move, and they're comfortable enough that I often forget about them and drive home wearing them. Find what works for you. I can't hang a picture without having my frankenbelt on. Everything I need to work is at hand all the time.

Wear the bags. To put it colloquially, if I have to wait for you to get a pencil or find your tape measure because your tool pouch is uncomfortable, go home. If your business is about production—and it is, because they all are—there isn't time for the guy to be looking for where he put this or that.



Old and battered like the authors, the pouches are portable tool kits. Essentials for the task are in easy reach at all times, not scattered (above).

Marc. Belts have been brought up before by others talking about being organized (see “Working Smarter, Not Harder” by John Spier, Mar/Apr 2024) and are a pet peeve. I know the belt can be uncomfortable at times. After more than 20 years of wearing one (the same belt), I understand. So figure out what works for you, your work, and your body type. There will be a combination that will function for you, but it may take a few tries to find it. The point of the rig is to have what you need right where you are.

Like Mark, I can't think of carpentry without having my belt on. The benefit is that if I need a measurement, a fastener, countersink, whatever, it is at hand. It does not become

a game of tool hide and seek.

For example, you need to take and mark out a measurement. The pencil and tape are at the cut station where you were last. You fetch the items and then return to where you were. What were you doing again? Oh yes, a layout! Time was lost to the search, to mental distraction off task, and to refocus.

Get a comfortable rig, don't burden it with more than you need, and you become a functioning part of the job instead of a tourist wandering around the jobsite looking for things.

The examples that we talked about here are all things that worked for us. For you or your crew, they could and will probably be different. Except the tool belt. That is a hill I will die on. Wear it. If I never have another apprentice to train just to watch them wandering around looking for their tape measure, I will die content. The point of the examples is to make you think about how you work.

The skills involved in framing, masonry, electrical, and so on can be improved by practice and tutorial. The way you get those tasks done can also be improved if you are open to learning and practicing. An efficient work site or solo job will take less time and effort. With that comes more money, more time for you, and an easier career.

That last bit about the career can seem a stretch, but follow my thinking here: If you are taking fewer steps, making fewer and easier lifts, and experiencing less stress, you are giving your body and mind a gift. The pay bump when you finish a job faster is nice, too. Audit what you do each day, discuss it with colleagues, and look for solutions to simplify your process. Any gain, no matter how small, is a win. The trades are problem solvers. This problem is one whose solution is all to your benefit.

Mark Clement is a contributing editor and former editor of Tools of the Trade in Ambler, Pa. Marc Forget is an associate editor at JLC.

JLC INTEL



FROM FLASHING TO FASTENERS: 5 MISSTEPS THAT COULD SINK YOUR WINDOW/DOOR INSTALL

How pros keep water and air out—and what you can do to avoid costly callbacks.

Airtight, watertight window installations

don't happen by chance. They come from careful prep, precise sequencing, and a healthy respect for building science. Miss a detail, and you risk air leaks, rot, or expensive warranty claims. Here are five of the most common mistakes installers make—and how seasoned pros recommend avoiding them.

1. FLASHING THE WRONG WAY

Improper or incomplete flashing is still the No. 1 source of leaks.

“The biggest thing, especially doing remodeling, is when we take an existing window out, you can see why there’s such a high focus on flashing and the window flashing tape,” says Mike Whalen, lead carpenter at DBS Remodel in Poughkeepsie, N.Y.

Whalen stresses shingle-style sequencing: sill first, then sides, then head flashing. A drip cap is a must. “It’s that positive water flow that you would see on roofing,” he says.

2. SKIPPING SILL PANS AND DRAINAGE

Drainage details are too often overlooked.

“We do [use sill pans], especially on sliders,” Whalen says. “We’ll manufacture those ourselves out of aluminum.”

Veteran consultant Mark Parlee adds that a sloped rough opening sill makes a big difference: “It’s good to tap up on your rough opening sill just a little bit to give it a tilt toward the exterior so that it can in fact drain.”

When using a metal sill pan, it should never break the pane of the interior face to avoid transferring energy. It’s also important to place the interior air seal behind the pan.



3. BLOCKING THE DRAIN PATH

Foam and sealant placement can be risky to use. If you seal off the drainage cavity behind the flange, trapped water will have nowhere to go.

“Now you don’t have a cavity,” Parlee warns. “Also, the spray foam ... doesn’t have a lot of movement capability.”

Instead, he prefers sealing from the interior with a backer rod and caulk to preserve drainage while allowing flexibility.

4. TRUSTING CAULK TOO MUCH

Caulk isn’t a cure-all.

“Overreliance on sealants that don’t last forever” is a major concern, says Doug Horgan of Va.-based remodeling firm BOWA. His advice: Layer materials shingle-style and integrate the window with the weather-resistive barrier (WRB) instead of relying solely on a bead of caulk.

5. IGNORING THE BASICS—LEVELING, FASTENING, AND GUIDES

Some mistakes come down to rushing the fundamentals. Fasteners are a big one:

“I see so many guys using gun nails on vinyl flanges and they blow through them,” Parlee says. He recommends screws for better control.

Leveling and squaring are equally important. “If your window is wider than it is tall, then put your level on the bottom or the top and level it and then square it,” Parlee says. And don’t skip the manufacturer’s installation guide—it’s where spacing, compatibility, and warranty requirements live.

THE ANDERSEN ADVANTAGE

As these pros point out, even the best products will fail without proper detailing. That’s why manufacturers like Andersen provide extensive installation resources—from flashing and sill solutions to training videos and guides—designed to help builders sidestep these pitfalls. Pairing proven practices with engineered products gives contractors a higher degree of confidence in every install, and helps ensure fewer callbacks.

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Q & A

Q Why do we care about installing insect screening over small gaps in rainscreen siding but not about doing the same with large gaps in open-joint cladding?

A *Michael Anschel, owner of OA Design+Build+Architecture, responds:* Large gaps in cladding allow a lot of weather (wind and rain) to enter, which doesn't make for a great private and protected space for pests. In fact, there is so much airflow behind open-joint cladding, and it is so dry, that the bigger issue is how dusty it gets!

A small gap, especially when paired with a large protected surface (like most claddings that don't have open joints), makes the perfect protected house for insects or even bats. Wasps like to build their houses in the corners of eaves because they are dry. Spiders like corners (multi-slide doors are spider heaven). Bees like warm, cozy spaces with very tiny holes (stucco installed over lap siding is a favorite bee habitat).

How big should the gap be? When choosing a gap size for open-joint cladding, I've found it works to stay within this set of guidelines:

- The gap size can be between $\frac{7}{8}$ and 3 inches.
- The adjacent boards can be 3 to $7\frac{1}{2}$ inches wide.
- The relationship between the gap and the board need not be linear. For example, a wider board (say, $7\frac{1}{2}$ inches) may be bound on either side by a gap of $\frac{7}{8}$ inch, and a 3-inch cladding board may carry the same size gap.
- Open-joint cladding (OJC) laid out in a pattern of varying board widths looks better than a series of single-width boards. In the photo, below left, note how the boards vary in width, but the gaps remain consistent.



The wide gaps in open-joint siding make the space behind the cladding too drafty for insect habitat. And it's too small a space for spiders to build webs to catch flying prey.

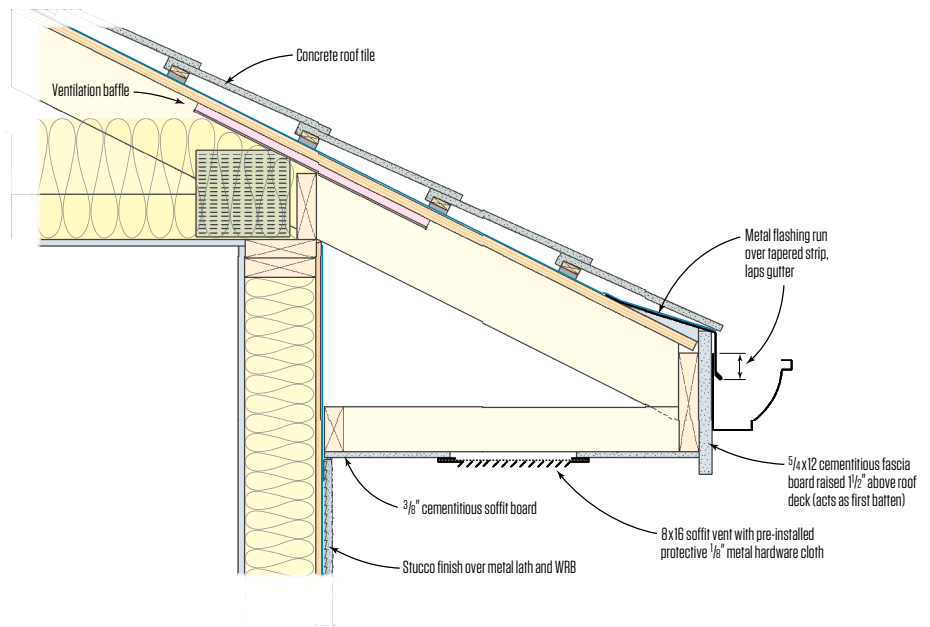
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Q During wildfires, burning material travels in the air long distances and starts fires along the way. For a home I am building in a forested area, how do I prevent hot embers from being drawn into the attic through the soffit and eaves?

A John Chamberlin, a Wildland-Urban Interface (WUI) expert from Georgia-Pacific, responds: This is going to be a long and expansive answer because I'd like to approach this more like an overall strategy than a solution to just one part. Because of population growth, the density of construction, and the locations of underdeveloped space, we are frequently building in WUIs. These are vegetated areas with things that can burn where homes are being built with materials that will burn. As we do not want to simply clear-cut these areas, we need to look at accommodation. That is why we have the International Wildland-Urban Interface Code (IWUIC).

A model code like the International Residential Code (IRC), the IWUIC helps guide fire hardening for construction. In the U.S., I believe, 26 states have incorporated into their building codes some degree of fire hardening. Depending on the type of the building, its location, and the climate in that area, specific steps can be taken to reduce the overall risk of fire. I would advise taking a whole-home approach to fire hardening, instead of just focusing on one part like your question does (which I will get to). A good resource, along with local codes, is the Insurance Institute for Business & Home Safety (ibhs.org). It has a "Wildfire Ready" program for hardening homes against extreme fire events.

Getting back to the question, the hot air carrying the embers is going to try to find cooler air, and high pressure is going to try to find low pressure. So, the outside air will try to push its way into the house's vents. The solution is install a noncombustible, noncorrosive metal mesh on



Section 504.10 of the IWUIC states that mesh openings should not exceed 1/8 inch, as shown in the illustration above. The author recommends 1/16-inch mesh. Check with your local building code for what applies in your area.

the inside of the vents. The mesh acts as back-up for the vent to catch the embers and prevent them from entering the home. Requirements for mesh size vary by state and even locality. The international code requires 1/4- to 1/8-inch mesh, but I recommend 1/16 inch, which is what the California building code calls for.

While installing mesh would help prevent the embers from entering the attic space, the builder should look at the rest of the home too. If the accepted 5-foot perimeter around the home is not clear of combustible material, like mulch, or if the siding and roof are not fire resistant, the mesh will be of little use.

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A Fix for Sunroom Window Trim

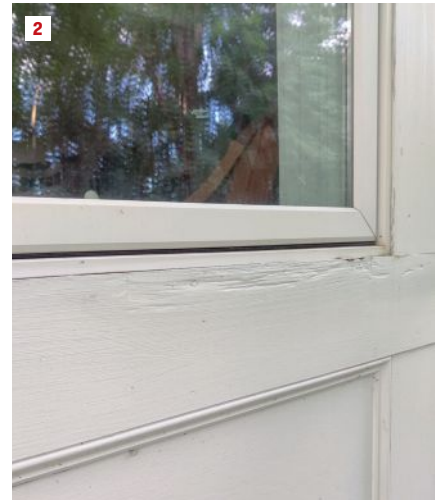
by ANDREW WORMER

Back in 2004, I enclosed an open front porch to create the four-season sunroom shown in this article. At the time, I didn't think the exterior wood trim would need replacing only 20 years later, as I had been careful about back-priming and double-priming end-grain cuts and diligent about maintaining the paint finish. I had also installed Benjamin Obdyke Slicker Classic rain-screen underlayment to create an air space for ventilation and drainage behind the flat plywood panels that make up the frame-and-panel trim detail underneath the 14 casement windows that enclose the porch.

Over the past couple of years, however, hints of rot had appeared in the window trim, until finally there was too much to just paint over. As I pried off trim pieces, it became clear that the damage was more extensive than I thought. I wanted to replicate the frame-and-panel look when making repairs but needed to revise my approach to avoid repeating the problem.

Sill

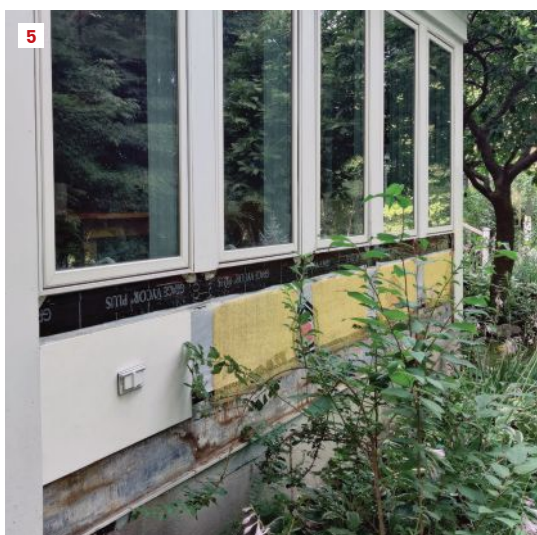
Most of the rot damage was in the horizontal $\frac{5}{4} \times 6$ trim that formed the top "rail" of the frame-and-panel detail directly beneath the windows. I found additional damage at the intersection of the vertical stiles and the bottom $\frac{5}{4} \times 8$ rails. While the clad casement windows had been well-flashed with self-adhering flashing tape and peel-and-stick membranes when they were originally installed, one key element was missing: a sloped sill that would shed water out and away from the trim underneath.



The existing frame-and-panel trim under the clad casement windows was fashioned from $\frac{5}{4}$ pine and $\frac{3}{8}$ -inch-thick plywood panels (1). Most of the rot occurred along the top edge of the horizontal trim members (2). The full extent of the damage could be seen after the author removed the trim (3, 4).

PHOTOS BY ANDREW WORMER

On the Job / A Fix for Sunroom Window Trim



First group of windows. Removing the trim (5) exposed the yellow Slicker underlayment originally used behind the plywood panels to provide drainage. The author tacks 3/8-by-1-inch PVC shims to the wall to prep for new 3/4-inch-thick PVC rails (6). After applying a thick bead of sealant to the underside of the window casings and trim, the author drives screws up through the new sill into the window trim to hold it in place (7). Then, he attaches the 3/4-inch-by-4 1/2-inch PVC upper rails (8) and stiles (9).



In our location, the long, south-facing wall of the porch bears the brunt of wind-driven rain. Water running off the clad windows had worked its way into the trim rather than dripping off. Retrofitting a sill to the windows would help to solve this problem.

I fabricated the new sills from 5/4x4 (nominal) Azek PVC, first cutting a 15-degree bevel along both edges of the stock and then ripping the boards in half to create 1-by-1 3/4-inch (actual) sill material. After ripping a 1/4-inch-

deep kerf underneath the tapered edge of each piece to form a drip edge, I used a sharp block plane, a belt sander, and 320-grit sandpaper in a sanding block to smooth away the saw marks on the tapered edges.

My original plan was to simply let in the new sill by cutting away 1 inch from the top edge of the upper rails while leaving most of the trim intact. In fact, this is what I did on the short west- and east-facing walls of the porch, which had significantly less damage than the

south-facing wall. I screwed a straight-edge to the wall to guide my circular saw while making the cut, being careful to set the depth of cut so that I wouldn't damage the membrane underneath. After priming the cut upper edge of the rail, I applied generous beads of Dap AMP adhesive sealant both to the underside of the window cladding and upper trim and to the top edge of the rail. The fit was snug when I slid the sill into place—enough so that no fasteners were needed—and required only a bit

more sealant along the top and bottom of the sill to complete the bead.

Along the long, south-facing wall, the trim below the 10 windows was so compromised that I removed it all. On the first group of five windows, I installed the new sill before the new trim, screwing up from below into the sealant-coated end grain of the 5/4x6 trim separating the windows. This worked well enough but made it challenging to shim the rails into plane with the stiles, as I describe below. On the second group of five windows, I installed the new stiles and rails first, leaving a 1-inch gap between the trim and the bottom of the window flanges for the new sill. This approach proved much simpler and cleaner, given the rainscreen detail I needed.

Rainscreen Detail

The existing detail provided a drainage space only behind the plywood panels. The original wood 5/4x6 top rail and 5/4x8 bottom rails had no drainage and suffered the most rot damage. This time, I ran the vertical stiles from directly underneath the new sill to the lead-coated copper L-flashing covering the concrete-slab porch floor. Between these 5/4x6 stiles, I replaced the top and bottom rails with 1-by (3/4-inch actual) PVC stock and, to allow drainage behind the new rails, I mounted them on 1-inch-wide pieces of 3/8-inch-thick PVC sheet stock. Any water not shed immediately by the sill or stopped by sealant between the sill and the rails can escape through the gap between the rails and the waterproofing membrane covering the walls.

Matching 5/4 wood trim (typically, between 1 1/16 and 1 1/8 inches thick) with 1-by PVC trim (which is exactly 3/4 inch thick) requires fussy shimming to get the surfaces in plane, especially when the water-resistive barrier covering the wall consists of different flashings and membranes of varying thickness. In addition to 3/8-inch-thick PVC strips, I used white-cedar shim shingles as needed to nudge the PVC rails flush to the wood stiles.



On the second group of windows, the author left a 1-inch space for the sill (10). Note the drainage gap behind the PVC top rail (11). When installing the bottom rails, he used a spacer to ensure the panel reveal remained a consistent size (12). To complete the sunroom exterior (13), the author framed the inset panels with PVC base cap molding.

To enhance drainage behind the new 3/8-inch-thick PVC flat panels, I tried installing a few of them over the Slicker rainscreen underlayment that I had used under the original plywood panels. But the edges of the PVC panels were too flexible and inadequately supported by the Slicker fabric matrix. So, I removed the Slicker entirely and tacked the PVC panels directly to the membrane-covered wall. Gaps between the edges of the panels and the vertical stiles will let water flow around

the panels and out of the assembly.

Finally, I trimmed each panel with 1 1/8-by-1 1/16-inch PVC base cap molding, which covers the gaps between the panels and the stiles and rails. To finish up, I'll fill in all the nail holes and paint everything so that all the wood and PVC surfaces will have the same color and sheen.

Andrew Wormer, a former editor of JLC and Professional Deck Builder, lives and works in Ferrisburgh, Vt.

Custom Window Seat With Storage

by GARY STRIEGLER

I have told more than a few clients that a window seat is a great way to gain function and dress up an under-used area of their house. Generally, there are two options: window seats with a fixed top and doors or drawers for storage underneath and window seats with a fixed front panel and a lift-up door in the lid. Both have their advantages, but most people prefer one or the other.

Planning

Recently, a new client who wanted to add some custom details to her production home contacted me. A window seat was at the top of her list. When we talked, I realized she wanted the best of both styles: a lift-up lid and two drawers underneath. She had a large dormer that was 5 feet wide by over 4 feet deep (many shed dormers have similar dimensions). Though I usually aim for a seat height of about 18 inches, she requested that it be 25 inches.

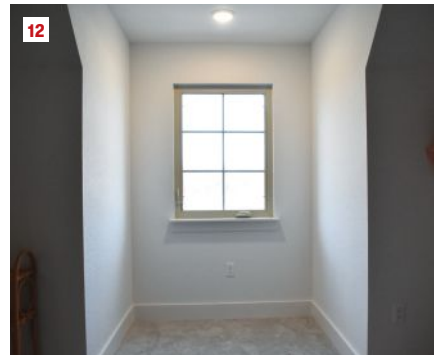
The good news was that I could make one large lid out of $\frac{3}{4}$ -inch birch plywood. I planned to build a two-drawer cabinet and set it 2 feet off the back wall. Since the space was carpeted and drywalled, all I needed to do to prep it was cut out some baseboard and add support for the lid to the back and side walls.

For additional storage, the client asked for an adjustable shelf unit on each side wall. Everyone envisions sitting on the window seat resting their back on the side wall and looking out the window, so I planned to make the shelf units 30 inches wide, leaving about 18 inches of clear area for back support. The project was paint-grade, but I decided to build everything out of $\frac{3}{4}$ -inch birch plywood.



The author pocket-screws the face frames (1) and rabbets the panels for the carcasses (2). Next, he glues, screws, and staples the boxes and back panels (3, 4). Then, he mounts the frames (5) and builds the drawers (6).

PHOTOS BY GARY STRIEGLER



Because the drawers are so large, the author adds extra supports (7) and heavy-duty slides (8). He positions and tacks the drawer fronts before securing them with screws from the inside of the drawer (9). He biscuits the top to mount the front edge and then glues and clamps it on. By doing all of the assembly in the shop, the author has better control of the quality of the project. Note the cut out in the top for flip-top storage access (10, 11). The next step will be to transport all the parts to the client's house and assemble and install the window seat on site (12).

Shop Build

The base cabinet with two drawers was the biggest part of the project so I started with that. With the 25-inch height and the width of the dormer, the drawers were going to be huge. I opted to use 22-inch, full-extension, ball-bearing drawer slides for strength.

I build drawers using 1/2-inch Baltic birch for the sides and front. I am

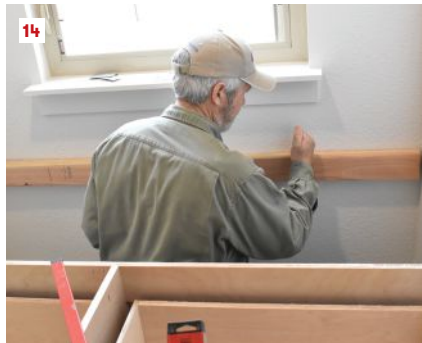
usually able to make the back out of scrap 3/4-inch plywood and, from 1/4-inch plywood, a bottom that slides into dados in each side and staples up into the front and back. For these large drawers, I moved the bottom up enough to add a 3/4-inch support in the middle for extra rigidity.

My joinery is simple. I nail through the drawer sides into the front and

back using 18- or 21-gauge brads. It probably sounds too simple, but I have built hundreds of drawers over the last 40 years, and none have ever failed.

I use shallow dados and pocket screws to build a cabinet box with a stretcher rail and 1/4-inch plywood back. I always build the box on a flat table, but it is a good idea to use a long level as a straightedge to double-check

On the Job / Custom Window Seat With Storage



On site, the author cuts out the baseboard (13) and levels and installs the drawer base (14). He mounts support rails along the back (15), then fastens the top of the window seat to the rails. Backer cleats attached to the top will secure the bookshelves (16). The trim on the base and bookshelves, top and bottom, hides the fasteners and tightens any gaps (17, 18).

as I build. Since the box would fit between two walls, I made it an inch under 5 feet and let the face frame overhang each side. The tightest spot in the dormer was at the outside corners. With the metal corner bead, it was $\frac{1}{4}$ inch narrower, so I needed to build everything to slide in past the tight spot and then trim it out after.

Installation

I started installation by cutting out enough baseboard to set the drawer base cabinet in place. Once I set and screwed the base cabinet, I leveled off it to locate a cleat for the back and side walls. Getting the plywood top in place was my greatest challenge. I trimmed the front edge band just enough to clear

the metal corner beads, then centered the top, leaving about a $\frac{1}{8}$ -inch gap on each side. I could have waited to add the front band, but it is almost impossible to get a tight joint between the plywood and edge band without clamps and pocket screws, so I chose to prefabricate the top in the shop using dominoes for alignment.

Next, I set the adjustable shelf units on each side, plumbing them up and fastening them to the walls with large trim screws. I then placed the adjustable shelves. Since the installation was upstairs, I had made a lot of the mitered cuts on the trim in the shop. That way, I just had to cut them to final length with a small, cordless miter saw set up in the yard. Everything was

going to be painted, so I used a little bit of caulk at the front band and to touch up the baseboard joints.

While we were cleaning up, the client looked up the hardware she planned to use on the drawers so I could predrill them. She shared with me that her daughter was so excited about the window seat that she wanted to stay home from school to see it. I enjoyed building the project, especially since I had never done one quite like it before, but I have to say that my favorite part of the job was being a part of making a child's dream come true.

Gary Striegler, a JLC contributing editor, owns Striegler and Associates, in Fayetteville, Ark.

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How Long Will This Take? Leveraging Volume per Week

by IAN SCHWANDT

In “From Jobsite to Office: Why Financial Metrics Matter,” the first article in this series, I wrote about gross profit per day (GP/day) and tied pricing back to the company budget and project duration. But how do we define project duration, and what are the financial consequences if we get it wrong?

I’ve struggled with the question of “how long will this take?” throughout most of my career. Usually, I’ve underestimated project duration, and that always cost me. This changed when I met Tony Carver, director of operations for Schloegel Design Remodel in Kansas City, Mo. Tony introduced me to a metric called “volume per week” (VPW), which is the average amount of project revenue a company produces per week based on similar historical jobs.

The power of VPW is twofold. It is a scheduling metric and a throughput metric. In addition to using VPW to set the overall project duration, my team has applied it to the different phases of the build to better understand how each production phase needs to overlap to achieve an accurate overall project schedule.

Tony takes VPW one step further: “If you calculate your total VPW for the year,” he says, “you can use that number to build your long-term schedule to give you a forecast of what you can produce over the year.” As a throughput metric, VPW is used in financial forecast models to estimate revenue volume as far out into the future as your backlog will allow. My forecast model currently contains VPW for two years out based on projects that are delayed or on hold.

Figuring VPW

To define your company’s VPW, all you need is the total revenue for your

individual build projects and the total duration in weeks each project took to produce. You might be thinking, “I know the revenue number, but I don’t know exactly how long it took.” I thought the same thing when I started tracking VPW. Tracking VPW is about constant refinement, so starting out with rough estimates of project duration is acceptable as long as you are committed to refining your VPW as your data improves.

As my team and I developed our understanding of VPW and GP/day, we realized we needed a clear, company-wide definition of project duration. We now define project duration as the start of field work through the client’s sign-off on the punch list, colloquially known as “hammer swinging time.”

I built my VPW spreadsheet by grouping 60 or so projects from the three previous years by revenue. For projects up to \$300,000, I used \$50,000 as the increment. From \$300,000 to \$700,000, I upped the increment to \$100,000. From there, the groups \$700,000 to \$1 million and \$1 million to \$1.5 million round out my VPW data sheet.

Once I grouped the projects, I divided each one’s revenue by its duration in weeks to find its VPW. I then used the project VPWs to find the average VPW for each revenue group. For example, a \$225,000 project produced in 15 weeks yields \$15,000 VPW. This \$15,000 VPW can then be applied to estimated projects in the matching range to develop a baseline duration. I often adjust this range up or down based on the specifics of the project. An addition project with overlapping interior and exterior scopes, for instance, can be produced at a higher VPW than a whole-house interior of

the same price due to the linear nature of the whole-house interior’s scope.

VPW is not just for number crunchers, however. When Tony first explained it, he emphasized that VPW is a metric he has integrated with his entire team. By understanding VPW, carpenters and managers alike share expectations for project durations, which is critical to defining accurate project schedules and accurate job pricing.

Combining GP/D and VPW

I previously made the case that gross profit per day (GP/day) should be the guiding star for what to charge. But GP/day works only if you can accurately define the duration of your project. That’s where VPW comes in. Strong VPW data also lets you tie project management and admin costs directly to duration, as these costs scale with weeks on site.

GP/day tells you how much gross profit per day your company needs. VPW tells you how many weeks a project of a certain size is likely to consume. Together, GP/day and VPW create a closed loop. GP/day defines what you need to earn daily; VPW grounds your estimate in how long the project will realistically take.

By combining GP/day and VPW, you stop guessing about both sides of the profitability equation. GP/day keeps your pricing tied to your budget, while VPW keeps your schedules tied to reality. Used together, they give you a clear, data-driven picture of what it takes to run profitable projects.

Ian Schwandt is the production manager for TDS Custom Construction in Madison, Wis., and the author of Nails to Numbers (nailstonumbers.substack.com).

How to Retire a Millionaire

by ROB CORBO

Most people in the trades, like me, didn't pick construction as a career because we thought we'd make millions. No doubt, a small percentage has. But most of us choose construction because we want to build, to work with our hands, to work with tools, to not have to wear a suit, and, maybe, to be our own boss. Still, I bet we all desire to retire with a million bucks.

We all know a million dollars isn't what it used to be. Also know this: Only 3% of the U.S. population has \$1 million in liquid assets. That's rather rarefied air. About 12% of all U.S. households have a net worth of \$1 million. Household net worth includes all members of a household and their combined assets, including primary residence, retirement accounts, investment real estate, and savings. So, retiring with a million dollars in your retirement account is a major accomplishment.

Here's one way to accumulate \$1 million in your retirement account: Contribute \$350 a month for 45 years (total investment will be \$189,000). If you average a 6.5% return on your investment, compounded annually, in 45 years, you will have \$1,034,563. (If your investment can compound quarterly, add another \$76,900.)

Wow, maybe not so daunting. Are you motivated? You'll need the same passion, discipline, and commitment required on the jobsite to pull it off. You'll need the passion to build financial security, the discipline to make a monthly contribution, the priority to change your family's fortunes, and the commitment to build wealth rather than spend conspicuously. Trust me, 45 years passes in a heartbeat.

The Significance of Time

Time to compound an investment, without question, is the main ingredient

for success. The more time you have, the more money you can accumulate.

For those of you with less than 45 years to invest, fret not. Saving for retirement is a worthy goal and should be pursued regardless of time. But to understand the significance of time, let's compare 45, 30, and 22.5 years of saving \$350 monthly at an annual rate of 6.5%, compounded annually:

- In 45 years, an investment of \$189,000 grows to \$1,034,563.
- In 30 years, an investment of \$126,000 grows to \$362,774.
- In 22.5 years, an investment of \$94,500 grows to \$201,888.

If you have less than 45 years to invest—and assuming you're older, more established, and making more money—you can up your monthly contribution and take advantage of compounding a greater amount for a shorter period.

The longer your money can compound interest, the greater the return. In the examples above, the difference between 30 years and 45 years is 15 years in time, \$63,000 in investment, and \$545,600 in returns—significantly more than the \$236,774 earned over the first 30 years. (To calculate returns, subtract the investment dollars from the balance for the time period you are looking at.)

Simply put, compounding means that when you make a profit on your original investment—perhaps through interest or stock appreciation—the total of the original investment and profit produces a larger investment base that then grows at an accelerated, or exponential, rate. Albert Einstein said it best: “Compounding interest is the 8th wonder of the universe. He who understands it, earns it; he who doesn't, pays it.” Folks willing to save and invest for

45 years “understand it.” So, wait no longer: Start a retirement account today and start compounding tomorrow, because time waits for no one.

Investment Vehicles

Another ingredient for accomplishing our goal of retiring with a nice chunk of change is having a tax-free investment vehicle in which to take the 45-year ride. A tax-free retirement account allows you to maximize your investment base. Because it is tax free, it gives you a larger sum of money to compound each year, maximizing your annual growth.

Roth 401(k). If you work for a company and it has a Roth 401(k) available with a percentage match, then that should be your tax-free retirement account. The most common company “match” is 50% of up to 6% of salary. That match gets you to your retirement goal faster and yields its own returns over 45 years. Needless to say, you should try to maximize your company's match—all 6%—if it doesn't create a monthly financial hardship. If you make \$50,000 a year, the company will match half of your first \$3,000 in contributions dollar for dollar. If you contribute \$350 a month for the year (\$4,200), at the end of the year, your total investment will be \$5,700—nice. The maximum allowable employee contribution to a 401(k) for 2025 is \$23,500.

Roth IRA. If you do not have access to a 401(k) fund, or you're self-employed and you want to keep it simple, stick to a Roth IRA. A Roth IRA allows annual contributions of up to \$7,000 if you're under 50 years old. If you're 50 or over, the IRS allows for an additional \$1,000 “catchup contribution,” for a total contribution of \$8,000. The \$7,000 contribution limit is well above the \$4,200 set as our goal and offers room

to increase the monthly contribution if you have extra funds. Because Roth IRAs are funded with after-tax dollars, all retirement withdrawals are tax free.

The IRS sets income requirements for contributing to a Roth IRA. Modified adjusted gross income must be \$165,000 or less for single filers and \$246,000 or less for a married couple filing jointly. If you can contribute more than \$7,000 a year to retirement and you're married, your family can open a spousal Roth IRA and contribute another \$7,000 to annual IRA savings.

A spousal IRA allows a nonworking spouse with little or no income to open an IRA based on household income, not their individual income. A spousal IRA can increase your household retirement contributions to \$14,000 or \$16,000 a year, depending on age. The disadvantage of opening a spousal IRA is that it wouldn't add to the original Roth IRA and enlarge its investment base for compounding. It would be creating a new investment.

Other IRA options not discussed here allow for larger annual contributions, but they are more complicated to start. (If interested, others are discussed in "The Future Is Now: Making Retirement Savings Work," Mar/2021.)

Investments

Once you open a Roth IRA or 401(k), you have to decide what to invest in. Investments run the gamut from certificates of deposit (CDs) to bonds, stocks, real estate, commodities, and crypto, to name a few. Some, like CDs, are low risk; some, like commodities and crypto, are high risk; and some, like real estate, require large amounts of money and are less liquid.

The challenge is to achieve a 6.5% return on your investment and balance risk, reward, and peace of mind. Stocks (ownership) in the companies that drive the U.S. economy offer your best shot at achieving a 6.5% return while balancing risk and reward over a 45-year period. Yes, investing in the stock market is risky and is often described as riding a roller coaster where some

You'll need the passion to build financial security and the discipline to make a monthly contribution.

years your investment is up and some years your investment is down. However, achieving an average 6.5% annual return over a 45-year period requires a more aggressive investment profile than CDs or bonds. Stocks have averaged a 10% return over the last 100 years and the S&P 500 (an index of 500 stocks) has returned 15.88% over the last 12 months (at the time of this writing). Treasury bonds have averaged 5% over the same 100-year period, and the 10-year U.S. Treasury Bond is currently yielding 4.05%. Certificates of deposit are presently paying a 3.5% yield for 12 months. For me, commodities and crypto are way too risky (remember, we're keeping it simple).

The "rule of 72" helps clarify what these percentages mean in real terms: Divide 72 by the interest rate (expressed as a whole number) on a particular investment to find the number of years it takes to double your money. At a 10% rate, it will take 7.2 years to double; at 3.5%, 20.5 years.

Two investment tools that balance the risks and rewards associated with purchasing stocks are diversification and dollar cost averaging.

Diversification means investing in a variety of companies so no single company's failure dooms your future. The best way to invest in a variety of companies is to invest in an S&P 500 low-fee exchange traded fund (ETF).

By using the dollar cost averaging method over 45 years to invest monthly in an S&P 500 ETF, you are at times buying when the stock market is high and at times buying when it is low. You must be disciplined and not panic when markets are tanking; that's when your fund is buying low, at a discount, and balancing risk over the long haul.

Investing, for many of us, is emotional, so watching your investment ebb and flow is dangerous. I have seen many a friend sell an investment just days before it hits its low. I suggest you "do no harm" and stay the course. Take pleasure when markets are selling off knowing that you are buying at a discount. Stay committed and make the monthly contribution in spite of the headlines. If you feel the need to do something, contribute more when the headlines report the sky is falling.

The importance of a low-fee passive investment, like an S&P 500 ETF, should be mentioned. Paying a high fee for your investment is an example of "he who doesn't [understand it], pays it" (from the Einstein quote). The expense fees for ETFs vary between 0.05% and 1.0%, lower than the 0.50% to 2.0% that actively managed mutual funds often charge. A \$10,000 investment with a 10% annual return over 20 years with an expense ratio of 0.50%, as we might get with an ETF, accrues to \$61,416. The same investment with an expense ratio of 2.0%, as we might get with a managed mutual fund, accrues to \$46,610. No need to say more.

If you want to invest, but don't have \$350, invest what you can. Start with small, comfortable contributions.

I suspect that for most of us, making it to a million dollars may require some of the following: living below our means, being frugal, driving a used truck, wearing a Timex watch, and prioritizing financial security. Texans express it well: You can have a "big hat and no cattle" or a small hat and lots of cattle. The choice is yours.

Contributing editor Rob Corbo is a building contractor based in Elizabeth, N.J.

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Garage Flashing Failures

by MARK PARLEE

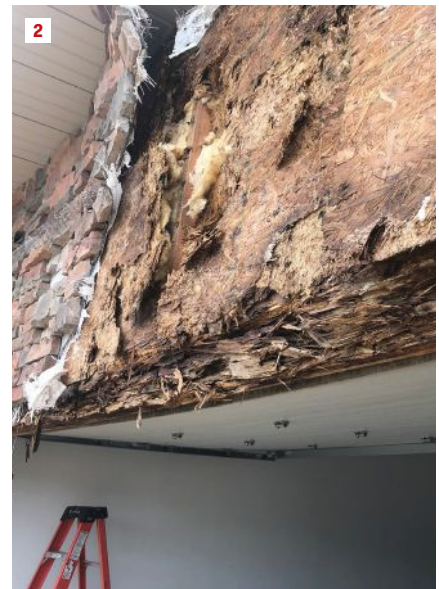
A big production builder recently hired me to help resolve a slew of exterior failures above garage doors. On more than 300 of the builder's houses, ineffective detailing and a complete lack of flashing over the garage doors has led to deterioration and, in a number of cases, severe rot of the garage door header and surrounding framing. This problem is not isolated to this one builder. I see similar problems around the country on my travels as a building investigator and expert witness. It's clear that many builders are not addressing these siding details effectively.

Mixed Siding Troubles

In this article, I'll focus on one of the production houses that suffered the most extensive damage. Parts of that house, including the face of the garage, are sided with manufactured stone, while most of the home, including the room above the garage, is sided with vinyl. Over the garage, the two cladding materials are separated by a wood band capped with aluminum coil stock; the garage door trim is also capped with it.

The severe damage shown in the photos on this page, including the complete devastation of the LVL garage door header, resulted from a series of missing flashing details as well as the lack of an effective drainage plane. The builder had applied a single layer of housewrap to the walls before slathering them up with mortar and applying the stone. Any water draining from the upper walls hit a mortar dam and traveled in three ways:

- Water that got through the vinyl siding flowed down the crack between the housewrap and the manufactured



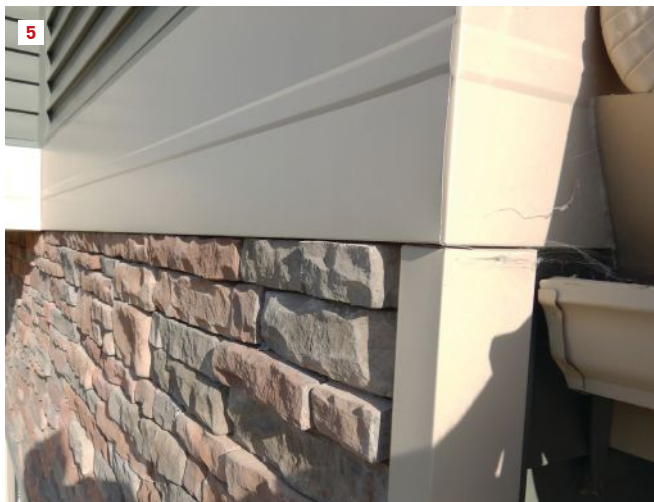
Mistakes with the WRB, the coil stock capping the band between siding types, and the flashing above the garage door led to the complete destruction of the sheathing above the garage door (1), turning the sheathing and LVL header into compost (2).



The capping of the band between siding types did not have an upturned leg (3). Without one, water drained into the wall. The lack of a kickout flashing (4) kept the corner of the garage framing soaked.

PHOTOS BY MARK PARLEE

Troubleshooting / Garage Flashing Failures



Remediation. Based on the author's recommendations, the builder installed a rainscreen mat over one layer of housewrap behind the manufactured stone and reworked the coil stock on the trim above the stonework (5). The builder also installed kickout flashing at the roof-wall intersection (6). Above the garage doors, a drainable weep screed bedded in sealant was added above the trim work (7). Once the façade was rebuilt, the house was better than new (8).

stone. There was no flashing here, just the vinyl starter strip.

- Some water flowed down the exterior, soaked through the manufactured stone, passed through the housewrap by capillary action, and soaked the OSB sheathing.
- Water also flowed around the coil stock, soaking both the wood band separating the vinyl and manufactured-stone sidings as well as the framing and trim surrounding the garage door.

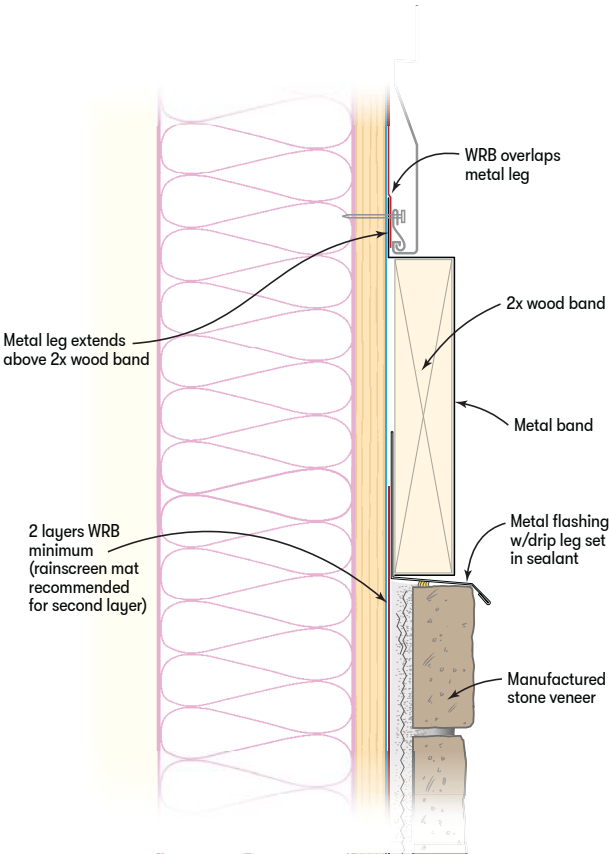
In addition to the problem of water leaking past the siding, this house was missing kickout flashings at wall-to-roof intersections. This dumped an extra-large volume of water onto the corner of the garage, accelerating the destruction of the framing.

All siding must drain. An adequate drainage space behind the siding is especially important with manufactured stone because all those chunks of concrete and mortar hold a lot of water. That water is more likely to leak into

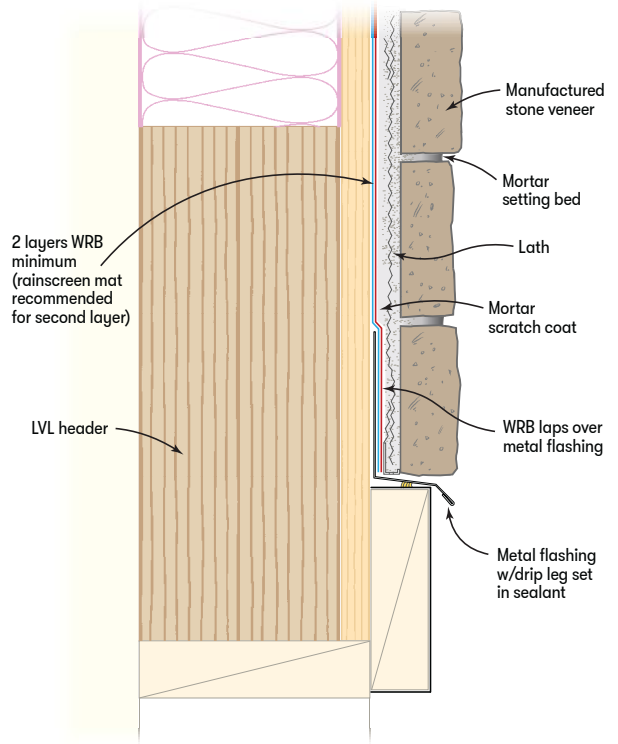
the framed wall than it is to evaporate to the outside. When mortar is applied directly to housewrap, it bonds to the housewrap and allows water to seep directly through the membrane by capillary action. For this reason, building codes require a two-layer WRB behind stucco and manufactured stone. In theory, the outer layer serves as a bond breaker, while the second layer functions as the drainage plane.

However, I don't think there's enough space between two layers of

Above Stone Detail



Below Stone Detail



Two critical details: The coil stock encasing the wood band has an upturned leg that serves as a flashing. The WRB laps over and is taped to this leg. Below the band, an L-flashing with a drip leg has been bedded in sealant. Both flashings direct water that gets behind the siding to the exterior.

As an alternative to the weep screed shown in photo 7, the base of the manufactured stone can be detailed with a metal L-flashing bedded in sealant. This flashing is installed behind a J-weep at the base of the mortar and serves as a counterflashing over the coil stock wrapping the door trim.

ordinary housewrap to provide adequate drainage. Instead, I recommend installing a rainscreen mat, such as Sure Cavity or Gravity Cavity from MTI (mtidry.com) over one layer of housewrap. The MTI products have a channeled plastic mat covered with a synthetic textile scrim. The scrim is supposed to function as the bond breaker. I recommend installing the scrim toward the building and facing the stiff plastic channels outward.

This technique evolved from our experience of failures with other rainscreen products that have an entangled mesh that's too soft to allow

expanded metal lath to self-fur. If the stand-outs on the lath fall into a channel of the MTI product, we want the mortar to fill the channel to encase the lath. And if they fall on the raised portion of the channel, the plastic is stiff enough to push the lath into the mortar to self-fur as intended.

Getting Capped Trim Right

Metal capping on trim can be problematic because it traps water and doesn't allow the wood beneath it to dry. To have a fighting chance, coil stock needs an upturned leg bent along the top so the WRB can lap it shingle-style

and be taped to the metal (see "Above Stone Detail," above left).

Above the garage door where there had been no flashing at all, I recommended installing an L-flashing over the capped trim screed (see "Below Stone Detail," above right). For the actual fix, the masons used a weep screed instead of an L flashing with a drip leg. Both will serve as a counterflashing over the capped trim, but I recommend bedding these metal trims in sealant to provide an added level of protection.

Mark Parlee is a building envelope consultant based in Urbandale, Iowa.

Avoiding Wood Flooring Gaps

by DOUG HORGAN



In an especially cold January (2025), shrinkage gaps between oak floorboards were a frequent callback. The dark stain emphasized the gaps.

When the Washington, D.C., area has a colder than normal winter, the calls start coming in. “Something’s wrong with our wood floor,” we hear from clients. “There are big gaps between the boards.” Fortunately, this is one of the most explainable issues we run into. Cold air is dry air, so homes that aren’t humidified tend to have low indoor humidity levels in the winter months, and wood boards shrink. With less moisture, boards get narrower; more moisture, they get wider. In areas like ours with seasonal moisture changes—cold, dry winters and warm, humid summers—wood changes size twice a year. Each board gets smaller over the winter and larger in summer.

Seasonal Moisture Changes

In regions with distinct seasons, the moisture content of wood changes gradually throughout the year as relative humidity changes. In some regions, humidity is more stable year-round. For example, the mountain west is relatively dry throughout the year. Along the Gulf Coast, it stays reasonably humid year-round. In northern states where summers are humid but brief, wood doesn’t absorb much moisture.

But in much of the U.S., especially

the middle of the eastern half (climate zones 3 to 5), we have humid summers and drier winters. In these conditions, it’s normal to have gaps in wood floors in winter. In our area, the humid season is the summer, so we can inspect the floor in late September or October to verify its condition.

Types of Gaps

At the end of the cold, dry months, it’s normal to see substantial gaps between boards. The size of the gaps will vary depending on the species of wood, the change in humidity levels, the width of the boards, and even the direction the board was cut from the original log. The amount of shrinking is predictable, and we can calculate the expected gaps in floors (see “Calculating Wood Floor Shrinkage,” facing page).

Usually, gaps are evenly spaced across the floor, showing that each board has shrunk at the same rate. Sometimes, however, several boards in a row have no gaps, and then there’s one big gap. This can be due to a finishing issue called “edge bonding” or “panelization,” where the floor finish glues the boards together, and all the shrinking of five or eight boards appears in one huge gap, resulting in several large

gaps that divide the floor into “panels.”

This is a finishing error. Most finish suppliers offer a first-coat product, such as a waterborne sanding sealer, that prevents edge bonding by creating a consistent base layer. That in turn prevents the finish from penetrating unevenly. We’ve had mixed results with leaving edge-bonded floorboards as is, hoping they separate over time. They do eventually, but it may take a season or more.

Controlling Moisture at Installation

If very dry flooring is installed with no gaps in the middle of winter, the wood will expand in summer, possibly so much that the boards buckle or even push interior walls around.

At the end of the humid season, wood floors should be tight. The National Wood Flooring Association (NWFA) recommends inspecting for gaps only at that time. If there are gaps then, it means someone messed up, likely by not controlling the moisture content of the flooring at installation.

While it’s a common myth that you can prevent problems by letting the flooring acclimate to indoor conditions before installing it, that won’t help if humidity levels on a jobsite are excessively high or low. In new construction and large renovations, curing concrete, wet framing lumber, and rainy or snowy weather that has been tracked in can increase indoor humidity levels significantly.

Bringing the flooring onto such a jobsite and allowing it to acclimate is counterproductive. The wood will take on moisture and swell, and gaps

PHOTOS BY DOUG HORGAN

Wood Floor Shrinkage Examples

Scenario	Enter info:					Results:			
	Label	Initial MC	Final MC	Shrink green > dry	Board width	Gap	Gap in 16ths	Gap in 32nds	Gap in 64ths
A	60%-20% Red oak plainsawn	11.0%	4.4%	11%	5.5	0.13	2.1	4.3	8.5
B	60%-20% Red oak quartersawn	11.0%	4.4%	5%	5.5	0.06	1.0	1.9	3.9
C	60%-30% Red oak plainsawn	11.0%	6.0%	11%	5.5	0.10	1.6	3.2	6.5
D	60%-30% Red oak quartersawn	11.0%	6.0%	5%	5.5	0.05	0.7	1.5	2.9

Equilibrium wood moisture from FPL Table 4-2. Recommend 11% initial MC and 6% final MC for 60% summer—30% winter interior RH @70°F.

Shrinkage value from FPL Table 4-3. Normally use tangential shrinkage: 8.6% for red oak, 10.5% for white oak. Quartersawn: use radial shrinkage: red 4.0%, white 5.6%.

Enter board width in inches (use decimals for fractions).

Results: total shrinkage in decimal inches ("Gap") and in fractions of an inch. Note these methods are "averages" and known to be inaccurate by 15% to 25%.

The table above shows a static example of the estimated size of shrinkage gaps in four wood floor scenarios (A-D), based on a calculator developed by Doug Horgan. For a free copy of the calculator as a working Excel file, send a request via email to jlc-editorial@zondahome.com.

Moisture Content of Wood in Equilibrium With Stated Temperature and Relative Humidity

Temperature		Moisture content (%) at various relative humidity values																		
°C	°F	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
-1.1	30	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.4	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3
4.4	40	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.4	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3
10.0	50	1.4	2.6	3.6	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.2	12.3	13.4	14.8	16.4	18.4	20.9	24.3
15.6	60	1.3	2.5	3.6	4.6	5.4	6.2	7	7.8	8.6	9.4	10.2	11.1	12.1	13.3	14.6	16.2	18.2	20.7	24.1
21.1	70	1.3	2.5	3.5	4.5	5.4	6.2	6.9	7.7	8.5	9.2	10.1	11.0	12.0	13.1	14.4	16	17.9	20.5	23.9
26.7	80	1.3	2.4	3.5	4.4	5.3	6.1	6.8	7.6	8.3	9.1	9.9	10.8	11.7	12.9	14.2	15.7	17.7	20.2	23.6
32.2	90	1.2	2.3	3.4	4.3	5.1	5.9	6.7	7.4	8.1	8.9	9.7	10.5	11.5	12.6	13.9	15.4	17.3	19.8	23.3
37.8	100	1.2	2.3	3.3	4.2	5.0	5.8	6.5	7.2	7.9	8.7	9.5	10.3	11.2	12.3	13.6	15.1	17	19.5	22.9
43.3	110	1.1	2.2	3.2	4.0	4.9	5.6	6.3	7.0	7.7	8.4	9.2	10.0	11.0	12.0	13.2	14.7	16.6	19.1	22.4
48.9	120	1.1	2.1	3.0	3.9	4.7	5.4	6.1	6.8	7.5	8.2	8.9	9.7	10.6	11.7	12.9	14.4	16.2	18.6	22.0

Adapted from Table 4.3 from the Wood Handbook (Forest Products Lab).

Shrinkage Values of Domestic Woods

Wood species	Shrinkage (%) from green to oven-dry moisture content		
	Radial	Tangential	Volumetric
Ash, White (American Ash)	4.9	7.8	13.3
Beech, American	5.5	11.9	17.2
Birch, Yellow	7.3	9.5	16.8
Butternut	3.4	6.4	10.6
Cherry, Black	3.7	7.1	11.5
Hickory, Pignut	7.2	11.5	17.9
Hickory, Shagbark	7.0	10.5	16.7
Maple, Sugar (Hard Maple)	4.8	9.9	14.7
Oak, Northern Red	4.0	8.6	13.7
Oak, White	5.6	10.5	16.3
Pine, Eastern White	2.1	6.1	8.2
Pine, Loblolly (SYP)	4.8	7.4	12.3
Pine, Longleaf (SYP)	5.1	7.5	12.2
Pine, Shortleaf (SYP)	4.6	7.7	12.3
Pine, Slash (SYP)	5.4	7.6	12.1

In this chart, shrinkage is expressed as a percentage of the wood's green dimensions. Adapted from Table 4.3 from the Wood Handbook (Forest Products Lab).

Calculating Wood Floor Shrinkage

Based on data from the USDA Forest Products Lab, I developed a spreadsheet calculator to estimate the gap size between boards of varying widths and wood species at varying moisture levels. The calculator (see chart at top for an example) relies on values from two tables in the *Wood Handbook*: Table 4.2 (above) provides data on the moisture content of wood in equilibrium with temperature and relative humidity levels, and Table 4.3 (right) provides shrinkage values for different wood species. To use the calculator, you look up the values in these tables and plug them into the appropriate colored cell.

The results are presented in several ways. "Gaps" are presented in fractions of an inch expressed as a decimal as well as in the number of 16ths, 32nds, and 64ths of an inch, which are often easier to count off a tape measure.

This information can be helpful when a distrustful client wants more than hand-waving from the responsible contractor, or when a client has an engineering bent and likes data. —DH

Troubleshooting / Avoiding Wood Flooring Gaps



To track indoor humidity, the author uses Hobo monitors if the house doesn't have a smart thermostat that can provide a readout of relative humidity over time.

may appear in the floor even after the humid season. Running humidifiers during the job can help.

According to Howard Brickman, a Massachusetts wood-flooring contractor and long-time *JLC* contributor, installers should measure the moisture content (MC) of the subfloor and the flooring with a meter before installation. The subfloor should not exceed 11% MC in the northeastern U.S., 14% in the humid Southeast, and 9% in the arid regions of the West. In western coastal regions, the acceptable subfloor moisture content varies from about 11% to 14% MC, depending on the local microclimate.

Then check the moisture of the flooring: It should be about 3.5 percentage points lower than that of the subfloor. That works out to 7.5% in the Northeast, 10.5% in the humid Southeast, and 5.5% in arid regions of the West. If the MC reading of the flooring is higher or lower than these regional levels, it should be unboxed and laid out directly on the subfloor until its moisture content, as measured with a meter, reaches the regional level.

What to Do About Gaps

Unless the floor has buckled or extreme panelization has occurred, we rarely call for replacing flooring. This can be a nightmare project that tears up a cli-

ent's house for several weeks (don't forget trim repairs and repainting). Even refinishing a floor can be an ordeal in an occupied home, and most hardwood floors can be done only a few times before there's no wood left to sand out.

In most cases, we advise leaving a floor as is, possibly seeing if the installers can undo any edge bonding. At least, wait until summer. The floor could be fine or, at least, mostly OK and need only a couple of small repairs.

The wood floor industry calls gaps "normal" or "abnormal" depending on whether they close up by the end of the humid season. "Normal" gaps are those that substantially close. Any gaps that are still open are "abnormal." Narrow "abnormal" gaps ($< \frac{3}{64}$ inch) are fixed with filler. In the unlikely event there are a lot of "abnormal gaps" in sequential boards or a larger gap, a repair may be needed.

The culprit causing most "normal" gaps is indoor humidity, and we first look to the HVAC system. In many cases, a humidifier should be installed (see "Humidifying Homes," Mar/2022). We also monitor the indoor humidity conditions over a period of time while evaluating the change in the gaps.

I typically use a set of Hobo monitors. Ours are old and need to be periodically plugged into a laptop to get a readout of the indoor conditions. Newer monitors can connect to a cloud or phone app so they can be tracked remotely. Or in some cases, the home may have a smart thermostat that includes humidity readings that can be monitored remotely.

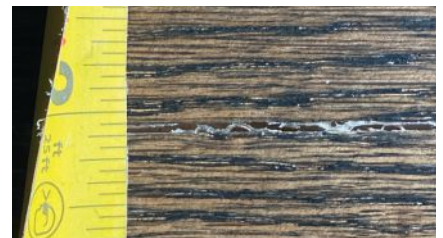
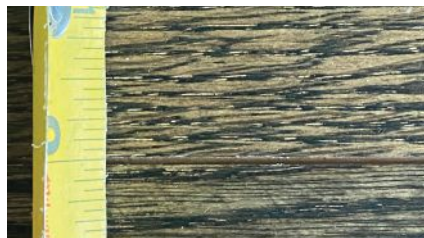
A case in point is a home in which the stained oak floors opened up last January, which was the coldest winter we'd experienced in Washington, D.C., since 2014. The house had a humidifier installed on the HVAC system, but it had not been turned on at the start of the season. Because the floors were stained a dark color, the gaps were especially evident. Gaps are more apparent on very dark or very light floors because the crack is such a different color.

The gaps in the third-floor bedroom were particularly noticeable. Most were about $\frac{3}{64}$ inch wide, with a couple closer to $\frac{1}{16}$ inch. The wider ones tended to have some normal gap filler or finish in the space, indicating the boards were slightly gapped at time of finishing, so the shrinking since then seemed to be consistent at $\frac{2}{64}$ to $\frac{3}{64}$ inch (see photos, below).

The relative humidity (RH) measurements we took varied from around 20% to 30% before the humidifier was fixed. RH climbed to 40% to 50% once the humidifier was running again.

In this case, as in most homes, we recommend maintaining indoor settings below 40% RH to avoid condensation issues in winter and monitoring windows for condensation (40% may be too high). Most clients report that 30% to 35% feels comfortable. At that humidity level, wood shrinkage is minimal.

Doug Horgan is vice president of best practices at BOWA, a design/build remodeling company in McLean and Middleburg, Va.



This gap (left) is about $\frac{1}{32}$ inch with no finish or filler, so the boards were probably tight when installed. This gap (right) is $\frac{1}{32}$ inch open, with about $\frac{1}{64}$ inch of finish in the gap, indicating a $\frac{1}{64}$ -inch gap when finished.

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IN-TRUCK REVIEW



GM's BrightDrop 400

Will this electric delivery van work for the building trades?

by MIKE WHALEN WITH CONTRIBUTIONS FROM PETER VALDES-DAPENA AND CLAY DEKORNE

EARLIER THIS FALL, I DID AN “in-truck review” of a BrightDrop 400 all-wheel-drive electric work van. GM dropped off the new vehicle at my company’s shop, and we had a week to drive it to and from jobsites and use it

as we would any work vehicle. We couldn’t build out the van’s cargo area to hold our tools, but we were still able to get a good idea of how the van would perform under working conditions.

Context. I’m a lead carpenter for

DBS Remodel based in Poughkeepsie, N.Y. Each year, the company does about \$7 million in revenue on around 75 remodels in the \$15,000 to \$500,000 range. We typically work on six to eight jobs at a time. The

PHOTOS BY MIKE WHALEN EXCEPT WHERE NOTED

other five lead carpenters and I own our own trucks, and we each have a company job trailer outfitted with the tools and hardware that we're likely to use on jobs.

Just before GM approached us to review the BrightDrop van, DBS Remodel ordered a new gas-powered Ford Transit. We plan to use it for small service jobs and to attend to punch-list items near the end of jobs, after we have pulled our work trailers off site but still have a few lingering finishes to install. While we haven't used the Transit yet, the purchase speaks to our company's need for such a van. The BrightDrop might be an alternative, although we hadn't previously considered an electric vehicle (EV).

EV Skeptic

As interested as I was in testing out a brand-new work truck, I was initially taken aback by its being an EV. I had no experience with EVs and never considered owning one. Clearly, the truck industry is headed in the EV direction, but I was not in the market for a new truck and have never been an early adopter of new tech.

The first electric pickup I knew about was the Rivian, billed as a "luxury" vehicle, which (along with an unrealistically high price tag) didn't present itself as a serious work truck. Ditto for Tesla's Cybertruck. The electric Ford Lightning, which went into production in 2022, and the first electric Ford Transit, which was produced about a year earlier, were the first electric work vehicles that I found credible.

For me, the electric vehicle category seemed to have too many question marks: Driving range? Battery life? Charging times? The resilience of the nation's power grid? If I thought about EVs at all, I reasoned all of the above would have to evolve before I considered an EV a work option. So, when I sat behind the wheel of the new BrightDrop, I was skeptical, to say the



For the building trades, the two critical features of the BrightDrop 400 van are its payload capacity of 3,480 pounds and excellent maneuverability. Cargo-area height with the door open measures 76 inches; floor length is 117.5 inches; and the width between the wheel wells is 54.71 inches, 83.68 inches wall to wall. There are ample tie-downs and rails for mounting custom toolboxes and shelving.

least. But it took me about eight seconds to be pleasantly surprised and only a few minutes more to become thoroughly impressed.

Under the Hood

My first reaction to driving the BrightDrop was realizing how powerful it is. It feels different from a truck with a big V8 internal-combustion engine (ICE). For starters, it's super-quiet and incredibly smooth. All I felt was acceleration, and I heard none of the higher pitch and increased noise volume that accompanies stepping on the gas of an ICE. (As much as I love the growl of a big gas engine, it's not a feature we look for in work trucks operating in quiet residential neighborhoods, particularly when we want to start work early in the summer.)

I also didn't hear or feel the downshift when I was bearing down on the gas pedal to power up a hill. Instead, I had the sensation of stepping on the drive pedal and feeling a quiet surge

of smooth, continuous power. Going uphill with a load of lumber, I never bottomed out on the drive pedal; there was more than enough power there if I'd needed it.

The two electric motors on the all-wheel-drive model we tested reportedly deliver 300 horsepower, which is less than any V6 in current models of light-duty ICE trucks. But horsepower is not the best measure here.

Unlike an ICE truck, an EV delivers instant torque, which gives the BrightDrop powerful, immediate acceleration from a complete stop. This is ideal for stop-and-go city driving and for getting heavy loads moving. Horsepower is a better measure of a vehicle's sustained power at higher speeds, which you need for towing. The BrightDrop is not designed for either towing or off-roading but, for hauling, it holds its own.

At 3,480 pounds, the payload capacity of the AWD BrightDrop 400 exceeds the 3,325-pound capacity of the



A significant benefit of a step van for the building trades is a cargo area that can be customized to organize and transport tools and equipment while leaving room to haul materials. Whalen's week-long test didn't provide the opportunity to realize this, but this photo from GM suggests the possibilities.

2025 Ford F-150—the leader among 2025 Class 2A pickups. (Compare this with the payload capacities of other full-size, Class 2A pickups: 1,750 to 2,280 pounds for the Chevrolet Silverado and 2,370 pounds for the Ram 1500 with a Pentastar V6. However, with a gross vehicle weight rating of 9,900 pounds, the BrightDrop 400 fits a 2B classification. That puts it in company with the Ram 2500 and Ford F-250, which have payload capacities above 4,200 pounds.)

The most we loaded on the BrightDrop was 50 2x6x8-foot studs with another 25 2x4x8-foot studs stacked on top—about 1,000 pounds in all. Not too surprisingly, we noticed zero change in the height of the suspension with this load. We certainly had a lot more room in the cargo area, and if this were our regular work van, we would probably be carrying at least 1,500 pounds of tools and hardware in addition to any materials, but even that would leave us a healthy margin to load it up more. The added weight would use up more battery charge, just as an ICE truck will use more gas or diesel when loaded.

Behind the Wheel

I was especially impressed by the BrightDrop's ability to make tight turns. As a full-service remodeling company, we usually work in residential neighborhoods with narrow streets and small driveways. The good maneuverability of the van was especially noticeable when we navigated through a lumberyard where the lanes between stacks of building materials were a bit snug.

BrightDrop's tight turning capacity is reportedly enabled by "four-wheel steering," which GM engineers derived from the Hummer's "crabwalk" feature. At low speeds, the rear wheels turn in the opposite direction of the front wheels, which effectively shortens the vehicle's turning circle and allows the vehicle to pivot more tightly than a vehicle with only front-wheel steering.

The listed turning diameter is just under 44 feet, on par with many full-size pickup tricks and quite a bit tighter than any of the 2025 full-size crew-cab pickups. This is remarkable, considering that turning diameter is usually correlated to the length of the wheel-

base. The BrightDrop has a relatively long, 153-inch wheelbase, almost identical to the Ram 1500 crew cab and only a few inches shorter than the rest of the full-size crew cabs, which have only 6-foot 7-inch beds or shorter.

The long wheelbase on the BrightDrop contributes to a cargo bed that's about 9 feet 9 inches long. With the door open between the cabin and the cargo area, you get an additional 2 feet or so of floor space, making it possible to slide in 10-footers or even a few 12-footers (though the cabin floor area in line with the cargo-area door is limited by the pedestal landing that the driver's seat is mounted on). The BrightDrop is considerably easier to load, too, since you can shut the rear door on long lengths of lumber and don't have to worry about flagging material that sticks out the back.

Camera visuals. The driving experience, and sense of security while hauling materials down a highway or through a busy residential neighborhood, is greatly enhanced by the van's visual supports. A button on the large dashboard screen toggles camera views all around the van. The driver can see virtually anywhere along the sides and at the back of the van. The computer even stitches together a bird's-eye view of the van and its surroundings, so you can see children, bikes, basketballs, and all the other things in a customer's driveway no one wants to run over. The camera views can be accessed anytime while you are driving the van.

Battery Charging

By far, the biggest adjustment for me was learning about the battery and charging it. Note that our tests weren't perfect: We didn't have another EV for comparison, and we couldn't fully load the truck with tools, which would have reduced the driving range on a charged battery. Over the week, we only had to charge the van twice. This was straightforward: Plugging in the charge cord is not much different from filling up at a gas pump, except for a green indicator light near the charging port that turns on when

PHOTO: GM ENVOI/VE

charging is complete. To stop charging before that happens, I simply had to press “stop” on the charging station or on the vehicle’s dashboard screen.

If we owned an EV, we would install a charger at our shop, so we could charge it overnight and wouldn’t have to waste production hours charging it during the day. With the max-range battery on the model we tested, it took about an hour to add 160 miles of range at a DC fast-charging station. (Reportedly, it takes about 10 hours with a Level 2 charger for a full charge, and about two hours with a DC fast charger.)

You’ll get better driving range if you don’t stomp on the drive pedal but instead accelerate gradually and evenly. It’s also better for battery health to avoid frequent DC fast charges. And like with phones or other devices powered by a lithium-ion battery, it’s best to charge to about 80%. (Cordless tool chargers do not allow this; power tool companies are in the business of selling us batteries.) The default on the



Charging at a DC fast charger is not much different from filling up at a gas station, except it takes longer. To maintain battery health, GM sets the maximum charge to 80%; it also recommends charging the battery when its capacity decreases to about 20%.

Charging an EV

“Fueling” costs vs. gas and diesel. Charged at home, EVs cost much less than gasoline- or diesel-powered vehicles. Electricity costs are calculated in kilowatt hours, or kwh, which makes it easy to estimate how much it would cost to fill up. For instance, the largest available battery pack on the BrightDrop van holds 173 kwh, which gives the van an estimated 272 miles of range. That works out to about 1.6 miles on each kwh of electricity. Electricity costs about 25 cents per kwh in Poughkeepsie, according to FindEnergy.com, which translates to about \$15.60 to drive 100 miles in the BrightDrop van. [Note: (100 miles/1.6 miles per kwh) x \$0.25=\$15.60]

By contrast, a rear-wheel-drive Chevrolet Express van would cost \$19 to drive 100 miles, at current gasoline prices. [Note: That’s based on 17 mpg, according to *Car and Driver*, and a gas price of around \$3 a gallon.] That means the BrightDrop van offers a roughly 20% savings in fuel costs.

Charger installations. Installing a charger has a cost, of course. It varies widely depending on the location and situation but is usually several hundred to a few thousand dollars. In many places, tax incentives and utility rebate programs help defray the cost. Charging overnight at home or at the office is the cheapest and most convenient way to “fuel” an EV, allowing the owner to start each morning (or end each day) with a “full tank” of cheap fuel.

Charging away from home. Charging an EV at a public charger will cost more than charging it at home because the charging company has to pay its operating expenses plus its electric bill and still make a profit. It still sometimes costs less than filling up with gas or diesel. The price depends partly on the speed of charging. A faster charge will cost more.

When people talk about public EV charging, they often discuss Level 2 or Level 3 charging. (Level 1 charging is essentially plugging into an ordinary household outlet.) Level 2 chargers are slower and cheaper than Level 3 chargers. They’re similar to a charger you would have installed at home and can add about 20 miles of range to a typical EV in an hour.

Level 3 chargers are the big ones that look like major appliances. They also usually have thicker cables. They range widely in speeds, usually expressed in kilowatts, from 50 kw up to 350 or more. The vehicle itself will have a maximum charging speed, though. In the case of the BrightDrop van, that’s 120 kw. That means you can plug it into a 350-kw charger, but it’ll only charge at 120 kw. Still, that’s enough to gain 160 miles of driving range in one hour, according to GM.

—Peter Valdes-Dapena

IN-TRUCK REVIEW: GM'S BRIGHTDROP 400



The driver's six-way-adjustable bucket seat (above left) is comfortable, but the fold-away jump seat (above right, in foreground) is not. For the trades, a bench seat that can seat three would be more functional.

BrightDrop limits the charge to 80% (160-mile range), though you can override this to get 100% charge if you need the full range (272 miles) for a longer trip. For optimal battery health, GM recommends keeping the vehicle plugged in when parked, especially in extreme temperatures. This allows the van to use an external power source to regulate the battery's temperature.

Cabin and Seating

The BrightDrop was initially built as a delivery truck so it includes features designed to shave minutes off “last mile” deliveries. For example, with the “delivery mode” engaged, shifting into park turns on the cabin lights, honks the horn once to alert people nearby, and unlocks the cabin and rear cargo doors—not a feature building tradespeople will ever want or use.

Instead of the van's six-way adjustable bucket seat for the driver plus the

Common EV Worries

Weather and driving range. Electric vehicles work most efficiently in, coincidentally, about the same temperature range that people enjoy. When temperatures drop much below freezing or rise above 90°F, an EV won't drive quite as far on a full battery. In the cold, an EV temporarily loses some driving range, mostly due to running an energy-sapping heater for the occupants, according to Recurrent, a company that tracks EV battery performance. Similarly, extremely hot weather reduces range, though to a lesser extent, when the cabin air conditioner runs.

Costs. Electric vehicles, generally, cost more than gas- or diesel-powered models in terms of sticker price. For instance, customers generally pay 26% more for full-size electric pickups than for similar gas-powered trucks, according to Edmunds.com. (Edmunds has not done this analysis for vans similar to the BrightDrop.) The difference is mostly due to the expensive batteries EVs run on. However, there are still various state incentives for EV purchases that can narrow, or even close, that gap. Including GM's incentives, the BrightDrop's sticker price is surprisingly close to that of its gasoline-powered counterpart, the Chevrolet Express van.

Leasing is particularly popular with EVs because it can help protect against the vehicle's losing a lot of value when trade-in time comes. Also, leases often offer more incentives that can lower the cost.

Another area in which EVs cost more is insurance. For various reasons, including their higher price plus the need to use specialized shops for repairs, insurance rates for EVs are generally considerably higher than for gas vehicles, according to AAA.

EV owners save money on fuel and, to some extent, maintenance, since EVs don't need oil changes, they have far fewer moving parts, and their brake pads last longer. Ultimately, many factors make it difficult to generalize about whether an EV saves money in the long run.

Battery life. If you're worried about that very expensive battery pack giving out on you, don't. It shouldn't be a major concern. Today, almost all automakers, including Chevrolet, offer at least an eight-year, 100,000-mile warranty on the big lithium-ion battery pack. As with any other warranty, it covers defects in the materials or construction. If the battery is damaged in an accident, that would be covered by insurance.

Fire risk. You may have read in the news about EVs catching fire. A few EVs have been recalled for spontaneously igniting. Keep in mind, though, that gasoline-powered vehicles catch fire much more often than EVs, and many gasoline vehicles have also been recalled for catching fire. It's hardly a problem unique to EVs.

—PV-D

Driving Differences

Quietness, smoothness compared with ICE. The first thing you'll notice driving an electric vehicle is how quiet it is. With no internal combustion engine, the source of most of a truck or van's noise is gone. In fact, EVs are so quiet that federal safety regulations require them to produce an audible sound outside when moving at speeds below 19 miles an hour so people can hear them coming.

Regenerative braking. An EV brakes differently from a gasoline-powered one. In most vehicles, the brakes work by pressing pads against a metal disc or the insides of a metal drum attached to each wheel. EVs can also use their electric motors to slow down. Basically, the electric motors turn off but maintain their connection to the wheels. When this happens, the wheels start pushing the motors instead of the other way around. (It's like engine-braking in a gas truck but with electric motors.) This creates drag that rapidly slows the vehicle. It also generates electricity that is sent back to the battery for driving.

EVs also have regular "friction" brakes, of course. They're just used less and so the pads last longer.

One-pedal driving. Many EVs, including the BrightDrop van, allow drivers to adjust how the regenerative braking works. At its "mildest" setting, the van operates much like any ordinary gas-powered van. When you lift off the accelerator pedal, the van will coast unless you step on the brake. However, you can easily adjust settings on the touchscreen so that, as soon as you lift off the accelerator, regenerative braking will start, and the van will begin to slow quickly.

You can turn it up another notch so that you can even come to a full stop without ever touching the brake pedal. In this so-called "one-pedal" driving mode, you may still need to press the brake for an emergency stop but, for a normal, predictable stop, like at a stop sign or red light, there's no need.

—PV-D



The BrightDrop's huge windshield erases any forward blind spots, and the enormous shelf area behind the dash is unusual but opens up many possibilities for organizing a tradesperson's daily carry.

small, not-too-comfortable jump seat that folds down off the back of the cabin wall, we would prefer a bench seat that could accommodate a couple of carpenters, even though that configuration would block the door into the cargo area from the cabin. The trade-off would make sense for our profession, especially if the bench seat could be designed to fold out of the way to allow occasional access to the cargo area (and we'd want to be able to slide long lumber under the seat). The lack of a bench-seat option was the one aspect of the BrightDrop that we didn't like and that would motivate us to look at other vans.

Touchscreen. The BrightDrop's centrally located touchscreen on the dashboard (GM calls it an "infotainment screen") is powered by Android Automotive with "Google Built-in" providing access to Maps (and other apps available from the Play store). The menu's simple grid structure is easy to navigate. The main application we'd use would be Maps, and if it were our vehicle, it would be nice to customize it to compare the miles to jobs against the van's driving range. Beyond this and access to charging and range data and the camera views, our company's chief concerns are the power, maneuverability, and overall ruggedness of the vehicle, not its entertainment system.

Midsize seems right. GM makes a larger EV van, the BrightDrop 600, with a longer cargo bed and more volume (614 cubic feet of cargo area compared with the 400's 412 cubic feet). While it's cool to think of the on-site-shop possibilities with the larger van, we'd stick with the midsize 400 to realize its exceptional maneuverability. For our business, the 400 would perfectly fit our needs if it had a different seating configuration.

What's Coming

If you go out to buy a new BrightDrop today, you'll be looking at 2026 models. Several improvements scheduled for the new model year seem appealing: The payload increases to 3,710 pounds; the cargo-area roof is reinforced so you can add a ladder rack there; and built-in 120V and 240V outlets that can deliver up to 7.2 kw split-phase AC power in the cargo area are standard. All are features that make perfect sense for the building trades.

Mike Whalen is a project manager at DBS Remodel based in Poughkeepsie, N.Y. JLC editor Clay DeKorne provided him with background research. Peter Valdes-Dapena, a journalist based in Queens, N.Y., covered cars and the automotive industry as a senior writer for CNN Business for 24 years.

STRUCTURE



Emergency Structural Repair

After a vehicle strike, a load-bearing wall needs more than a few new bricks

by JAKE LEWANDOWSKI

AS A FIRM SPECIALIZING IN STRUCTURAL repairs, we are sometimes called on to make emergency repairs to buildings. One common situation is a “vehicle strike”—when a driver slams into part of a building, creating a structural problem that needs immediate attention.

On a recent job, someone entering a townhouse garage hit the side of the garage door opening, significantly weakening the wall section supporting the

garage door header and second-story floor and roof loads and damaging an area of the brick cladding. The damage should have been addressed immediately, but it was several months before an engineer engaged by the homeowner’s association brought us in.

In the interim, an unknown “shoring contractor” had been hired to erect “emergency shoring.” However, that turned out to be two temporary adjustable columns, like those sold at most

big box stores, which he placed directly under the existing masonry lintels on both sides of the failed wall section. This only helped support (a little) the lintel supporting the brick but didn’t address the garage door header or the floor loads and part of the roof load bearing on the exterior wall.

Complete Shoring

We started by implementing a more comprehensive shoring design, which

PHOTOS BY JAKE LEWANDOWSKI



The impact from a vehicle strike stove in the exterior brick (1, 2) and undermined the structural integrity of the wall supporting floor and roof loads (3). Before the author's crew arrived, a lightweight jack post had been placed under the masonry lintel (4), but this didn't address any structural loads. The crew began by removing the finishes (5) before erecting a line of scaffolding to support floor and roof loads from above (6). As the crew disassembled the damaged wall and removed the brick (7), they cleaned the mortar off some whole bricks that could be salvaged for rebuilding the wall (8).

was developed by the structural engineer who called us in. Our first step was to remove all the finishes in the garage—the garage door, the opening trim and jambs, and the interior drywall on the wall sections near the opening and on the ceiling along the opening end of the garage. We then

installed solid blocking between the floor joists that ran parallel to the garage door header. The structural engineer specified this blocking to transfer the loads from the shoring we would need to install on the second and third levels onto the shoring in the garage.

With the blocking installed, we

were able to set the shoring in the garage on LVL blocks to spread the load over the slab. At the top of these shoring frames, we placed a set of 4x6 timbers on edge directly below the joist blocking. We added a 2x4 on edge to the outside edge of the LVL blocks to provide nailing for the

EMERGENCY STRUCTURAL REPAIR



As the crew took apart the wall, they discovered that the bottom wall plate had been buried in concrete (9). They carefully removed brick in vertical swathes, adding 2x4 posts under the brick as they went (10). With enough brick out of the way, they could erect shoring posts on steel needle beams (11) to carry the wall loads. The needle beams allowed the crew to excavate around the rotted framing (12).

plywood we used to build a temporary security wall.

Next, we provided shoring on the second and third floors (which we were asked not to photograph). We were able to stack this shoring directly above the shoring in the garage, providing solid support for the roof system all the way down to the garage slab.

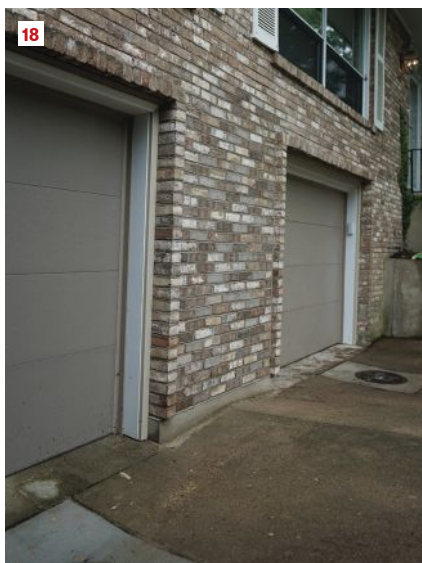
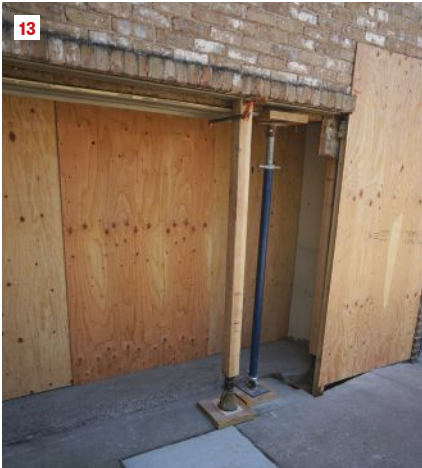
Finally, in accordance with the engineer's shoring plan, we erected additional shoring posts in the garage door opening to support both the garage door header and the steel lintels supporting the brick façade.

Surgical Demolition

Once our shoring was in place, we started to remove the damaged areas of the brick façade, along with the damaged 7/16-inch fiberboard sheathing. As we pulled this apart, we encountered water-damaged framing and rot at the base of the wall. The wall had been built on a footing that was below the driveway, with non-treated framing partially encased in concrete. Fixing this properly broadened the scope of the job and required getting a new structural detail from the engineer for a concrete curb, which would also require a prepour inspection from the city.

We carefully removed the brick in small vertical sections so we could fit temporary post shoring in place as we went, working toward the middle of the damaged wall section.

Once enough brick was out of the way, we set steel needle beams perpendicular to the wall extending from the driveway into the garage. We elevated this steel on blocks so it would form a bridge over the foundation, allowing us to form and pour the concrete curb. The steel needle beams also provided a stable base on which to erect shoring posts that extended up to the wall's double top plate. After we put these posts in place, we were able to safely remove the remainder of the framing that had been damaged in the vehicle strike.



The scaffolding lines were set in plane so the job could be closed in with plywood at the end of each workday (13). The crew attached the sill plate to a new concrete curb they poured (14), then they framed (15) and insulated (16) the new wall section. After sheathing the wall, installing a new stainless-steel through-flashing over the curb, and attaching heavy-duty brick ties (17), a mason used some salvaged brick and matching new bricks to finish the job (18).

Revised Design

Following the revised structural design, we built a concrete curb to elevate the bottom plate of the new wall above the driveway. This entailed excavating a shallow trench down through the slab to the existing foundation and then epoxy-anchoring rebar into that existing concrete to tie it to the new curb.

The revised structural plan also called for using PSL columns to support the garage door headers, instead of simply replacing the existing 2x6 framing, as specified previously. After forming and pouring the curb, we added a capillary break between the new curb and a new pressure-treated sill plate, then framed the wall with the specified PSL cripples and 2x6 studs with solid blocking at the mid-span. We finished the frame off by insulating with mineral wool and replacing the fiberboard with 7/16-inch Zip System sheathing.

With the new framing complete, we could safely remove the shoring supporting the wall loads. We kept the post shoring that supported the existing steel lintels holding up the brick in place until we had attached our brick ties and reset the brick veneer with a stainless-steel drip edge around the base. Once the job was completed with new jambs and a garage door, all evidence of the vehicle strike was gone. Except for the small portion of the concrete curb showing, no one would ever know what happened.

JLC contributing editor Jake Lewandowski is a construction manager with Great Lakes Builders near Chicago.

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by VINCENT SALANDRO

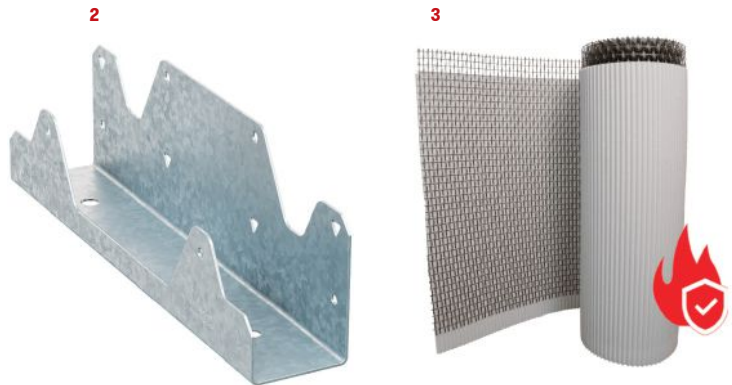
1. Vacuum Insulating Glass

Kolbe Windows & Doors has added vacuum insulating glass (VIG) options from LuxWall to its Ultra Series and VistaLux WD Line windows and doors. According to the manufacturer, a small, virtually airless vacuum space between the panes of glass improves thermal insulation, comfort, and energy efficiency. The new glass options include two panes with one low-E coating and three panes with two low-E coatings. *kolbewindows.com*



2. Post-Frame Purlin Splice Connector

Simpson Strong-Tie says its PFPS24 purlin splice connector for post-frame construction keeps purlins in line along the entire length of a trussed gable roof and eliminates the need to offset and overlap members. The PFPS24 is available with minimum and maximum fastener options, depending on load requirements, for value engineering. Contractors can also reduce material costs with this connector because they can use shorter, less expensive purlin stock. *strongtie.com*



3. Moisture-Managing Stucco Lath

Sure Cavity Stucco Lath from MTI combines a rainscreen with fire-rated stucco lath to help manage moisture, meet fire codes in International Wildland-Urban Interface (WUI) zones, and save on labor. An integrated layer of perforated and corrugated polyester material creates a $\frac{3}{16}$ -inch drainage gap while a vapor-permeable lath supports ventilation. MTI recommends lapping the sheets shingle-style at horizontal seams, using the integral 2-inch skirt. The product weighs less than metal lath and won't rust, according to the manufacturer, and is ideal for multistory residential and commercial applications. *mtidry.com*

4. Terra Cotta Façade

Extruded from traditional clay and fired at extreme temperatures, SK1N cladding from GlenGery provides a terra cotta aesthetic to exteriors. Suited for vertical applications, the tiles install shingle-style with staggered seams on horizontal furring over a weather-resistant membrane. Preformed holes in the tiles help speed installation. According to the manufacturer, an integrated rear-ventilated rainscreen improves thermal performance and air circulation. *glengery.com*



Products



5. Aluminum Entry Doors

Therma-Tru's Veris Modern Grain entryway door combines a thermally broken aluminum frame with walnut-grained fiberglass panels and glass. The doors are available in heights up to 10 feet and in pivot or hinged configurations. Glass options include low-E clear glass, gray-tinted "turtle" glass to protect turtle-nesting areas from interior light, and "satin" privacy glass. In addition, builders can choose from four handleset styles in five finishes. thermatru.com



6. All-Climate Heat Pump

The AirEase Pro Series A7CP21V All-Climate Heat Pump achieves ratings of up to 21 SEER2 and 10HSPF2 even when outdoor temperatures are as low as 5°F, according to the manufacturer. The heat pump's variable-speed compressor helps ensure consistent, energy-efficient heating, cooling, and humidity control while operating at quiet sound levels. Pair the heat pump with a Comfort Sync A3 thermostat to customize a home's comfort room by room. airease.com

7. Efficient Energy Recovery Ventilator

Energy recovery ventilators (ERVs) exchange stale indoor air with filtered air while recovering energy from outgoing air and managing indoor air pressure. Panasonic says its Intelli-Balance Elite ERVs, designed for temperate climates, can operate in temperatures as low as 14°F, at which point they enter a stand-by mode. Designed for cold climates, Elite Plus+ units can function down to -22°F, according to the company, before going into one of two frost-protection modes (recirculation or exhaust only). Models in both lines have a speed selector for managing airflow and indoor air pressure. And, according to the manufacturer, units have a membrane core that can reduce inbound moisture loads by up to 40% in humid climates. na.panasonic.com/us



8. Interior Fire-Rated Plywood

Garnica's Fireshield plywood is fire-rated for interior construction, carrying the highest fire performance ratings for wood products, ASTM E-84 Class A. According to the manufacturer, the fire-retardant treatment penetrates the entire panel, even after sanding or machining, ensuring low carbonization and fire stability. Garnica's Fireshield is ideal for cabinetry, built-in furniture, and ceiling applications. garnica.one

9. Expansive Glass Wall

The AX650 Moving Glass Wall from Milgard Windows and Doors is available in pocket glass, stacking glass, and bi-fold glass door configurations in heights up to 10 feet and panel widths up to 5 feet. The AX650 offers dual glazing for improved energy efficiency and is available in a Title 24 Energy Package to comply with California's energy standards. Other options include four frame finishes and flush or contemporary hardware styles. milgard.com



10. Waterproof Backerboard

USG Fiberock AquaSmart Tile Backerboard is a gypsum fiber panel with a uniform, waterproof composition throughout. It was able to withstand hydrostatic pressure testing with no visible penetration over 48 hours, according to the manufacturer. With a 0.42-inch thickness, the backerboard is compatible with modern substrates. The manufacturer says that it weighs less than traditional backerboard and has a Class A fire rating. Recommended applications include under tile, stone, vinyl, hardwood flooring, laminate flooring, carpeting, and countertops. When used for walls, it can be painted. usg.com



11. Exterior-Grade Fire-Retardant Wood

SaferWood with Thermex-FR is solid-sawn lumber or plywood that has been pressure-treated with Chemco's fire-retardant chemicals to create ignition-resistant, fire-retardant wood (FRTW) with a Flame Spread Index less than 25 and a Smoke Development Index less than 45 on listed species (see ICC-Evaluation Service Report 1159). According to the manufacturer, SaferWood's use is compliant with codes in International Wildland-Urban Interface (WUI) zones in applications such as siding, deck, railing, and exterior plywood sheathing. It is also approved for interiors. saferwood.com



12. Slip-Resistant Flooring

AHF Products has released an enhanced Armstrong Flooring slip-retardant Safety Zone Tile in colors that match the manufacturer's Standard Excelon Imperial Texture line of vinyl composition tiles. The updated flooring has an embossed surface embedded with particles and provides twice the slip resistance of standard vinyl composition tile in wet conditions, according to the manufacturer. armstrongflooring.com/en-us



Tools of the Trade

Weigh In! Want to test a new tool or share a tool-related testimonial, gripe, or technique? Contact us at jlctools@zondahome.com.

Makita 16 5/16-Inch Cordless Circular Saw

by **TIM UHLER**

Remember when cordless tools seemed like toys? Today, my crew runs 100% cordless. And Makita recently raised the bar with the XGT GSH06T, a cordless 16 5/16-inch circular saw that can cut 6-by lumber. Makita claims it's the world's largest cordless circular saw.

On the Job

I don't like blade-right saws. I'm right-handed and grew up using worm-drive saws, which have the blade on the left side, where it is easier to see. Because I can see the left side of the blade on this Makita, I can use it as I would a worm drive.

On a big saw like this, a brake is a must-have, and this one works well. I appreciate the soft start, too. You don't get that torque kick that the old worm drives had.

Cutting LVL, glulam, and 6x10 or 6x12 Doug fir is a breeze for this saw. LVL is the toughest, because it wants to close on the blade, but that's true with all saws.

Makita claims the saw can "deliver up to 75 cuts per charge in 6x12 lumber with the 5.0-Ah battery." Battery life isn't an issue for me; I have a lot of Makita batteries. And I physically couldn't make 75 repetitive cuts with a saw this large. But the point is, the saw will last as long you need it to.

Features

The saw has a cutting depth of 6 1/4 inches for straight cuts and 4 13/16 inches at a 45-degree angle and has both an electronic brake and soft start to improve handling. Not surprising, it tips the scales at a hefty 29.21 pounds with the 5-amp battery (for comparison, a corded Skil 16-inch comes in at 32.4 pounds). An included dust port allows for attachment to a vacuum. The unit is also compatible with Makita's auto-start Bluetooth dust-extractor system.

This saw is expensive. Is it worth buying? It isn't a necessity on our framing sites because we can use a 10 1/4-inch saw and make an extra cut with a lighter saw. But if you cut a lot of 6-by or 45-degree angles on 4-by stock, and the bigger saw would speed up your workflow or improve the quality of your work, then it could be worth the investment.

The kit with saw, battery, and charger costs \$1,400; the bare tool, \$1,000. makitatools.com

Tim Uhler is a lead carpenter for Pioneer Builders in Port Orchard, Wash., and a contributing editor to JLC. Follow him on Instagram at @awesomeframers, subscribe to his YouTube channel, or visit his website at awesomeframers.com.



The author found the Makita XGT GSH06T saw to be easy to control thanks to its soft start and well-distributed weight (1). The size and cost of this cordless 16 5/16-inch saw are both substantial, but if you regularly cut oversized material, this tool could help speed up your workflow (2).

PHOTOS: TIM UHLER

DeWalt Cordless 7 ¼-Inch Sliding Miter Saw

by **MARC FORGET**

I used to cut a lot of trim. A 12-inch miter saw (and stand) was usually one of the first tools out of the van. However, on many jobs, the size and cutting capacity of the 12-inch beast were overkill. On other, large jobs with my partners, it was clear that a second saw would reduce the time we wasted moving around on site and taking turns to make a cut. My solution was a DeWalt 7 ¼-inch sliding miter saw (DCS361M1).

The saw runs on 20-volt batteries, so I didn't need an outlet nearby to use it. A 4-amp battery lasted three-quarters of a day—plenty of time to charge a backup. The 7 ¼-inch blades are much less expensive than 12-inch ones, so a new, sharp blade didn't break the bank. With the saw's smaller size and weight (31 pounds), I could carry it one-handed and haul it upstairs or onto tight balconies when a larger saw would have been a chore. The built-in light illuminates the cutting area and can be left on when the saw's not in use.

Cutting capacity is 8 inches for straight cuts and 5 ¾ inches at 45 degrees. Usually, this was enough for casing and baseboard or window jamb extensions. For shoe molding or small applique, the saw really stood out. I could move from floor to floor or even room to room much quicker than with a larger saw.

I purchased the DeWalt as a backup saw, for which purpose it worked perfectly. It does not replace my larger saw. One reason is that the smaller saw bevels in only one direction. This was once standard, but if you are accustomed to a double-bevel saw, it takes a moment to orient the material.

I also found that the blade doesn't have a high rate of spin, so on hardwood trim or some larger pine, I have gotten tear-out on the back. Chipping has been an issue with laminate flooring, melamine, and finish plywood, too. In those cases, I needed to score or back-cut the material to ensure a clean finish.

This is a smaller, lightweight saw for smaller, lighter-weight work, which it does well. I've worked this saw for a few years and have not had any issues with reliability (unlike my larger unit, which I've needed to replace brushes on and regularly check for square). As a light, portable, and reliable saw to get through occasional trim or to backstop my main miter saw, this unit has earned its cost for me.

The DCS361M1 kit with battery and charger costs \$440; the DCS361B (bare tool) costs \$350. dewalt.com

Marc Forget is an associate editor at JLC.



The DeWalt DCS361M1, with its open side grips and a top handle, is easy to move around a jobsite (1). Note the difference between the 7 ¼- and 12-inch saws (2). Not every job needs the biggest tool.

PHOTOS: MARC FORGET

Makita Oil-Impulse Driver

by RICH KRAMER

I appreciated Marc Forget’s article, “Job Site Physical Fitness,” in the July/August issue. Taking care of our bodies should be as important as putting our tools under cover when it starts raining. I believe that care includes not only exercising and resting, but also choosing tools that are gentler and easier to use. Switching to a lightweight, cordless circular saw from my old 13-pound plug-in beast, for instance, was a massive improvement. Replacing my impact driver was another.

Most carpenters are familiar with modern impact drivers. But many carpenters don’t know that there’s a quieter, gentler version, the oil-impulse driver. Several years ago, I was suffering from tennis elbow due to the repetitive strain of my work, including, I believe, using an impact driver to install floors. I did various kinds of physical therapy, then I discovered oil-impulse drivers. I bought one made by Makita, model XST01Z, and I credit it with rescuing my carpentry career.

Benefits

The Makita has made a tremendous difference as I work through a day. My arm does not hurt after a day of driving screws because the tool doesn’t pass the impact or vibration

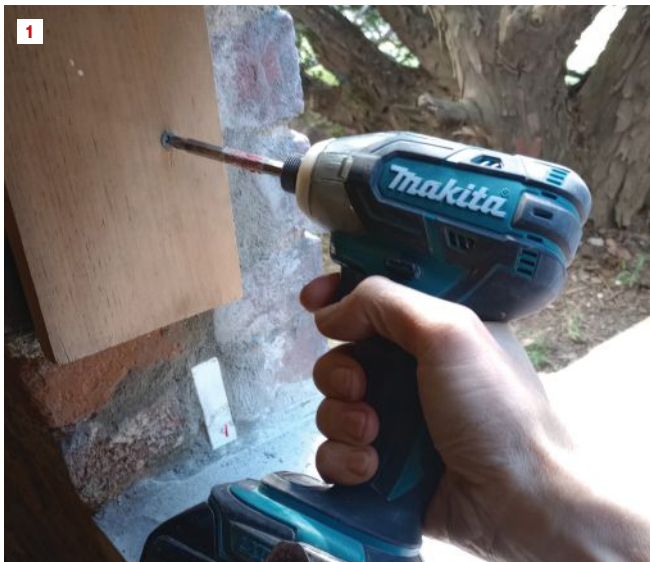
to my hand, and my ears get a break from the loud noise of a traditional impact driver.

Another benefit of the Makita driver is that it has three speed settings for driving screws, from delicate small screws to heavy ledger bolt fasteners. I use level 2 power for just about all my work. But if I need a super-boost for a 12-inch TimberLok, I can notch up to level 3 and get all the power I need.

For power, I use a 3-amp-hour battery, which lasts the whole day for me. If the battery runs down, that’s a sign to pack up and go home! With the 3-Ah battery, the tool is well-balanced in my hand. The built-in light has an independent on/off switch for lighting the work area and can stay on even after the trigger is released.

Be careful when researching this tool online, since a web search might bring up just a couple of sites with oil-impulse drivers and a number of others with traditional impact drivers. The price is now about \$240 (bare tool) for the Makita XST01Z. Compared with taking time off for physical therapy, the price is worth it. makitatools.com

Rich Kramer is the owner of Wood is Good in Berlin, Mass.



The author reports that the XST01Z 18-volt oil-impulse driver (1, 2) performs as well as the standard impact drivers most carpenters are more familiar with. He also found it quieter and easier on his body, thanks to its low transfer of energy to the operator’s wrist when in use, regardless of speed setting.

PHOTOS: RICH KRAMER

The Splurge

Have you ever splurged on a tool upgrade? You're not alone.

by **MARC FORGET**

My name is Marc and I am a tool guy. One aspect of the trade that I have always enjoyed is discovering, discussing, buying, and using tools. I confess, I have taken on jobs to justify the purchase of a new piece of equipment. That urge to buy the new and shiny is tempered, however, by financial reality and practicality. I know that the \$400 hammer with custom colors and space-age materials won't drive nails that much quicker than my old Estwing, so I resist. The same goes for a new rafter square with micro laser etching and hi-vis finish for my tool pouch. My over-20-year-old one can still mark a line or scrape ice off a 2x4 just fine. So I resist.

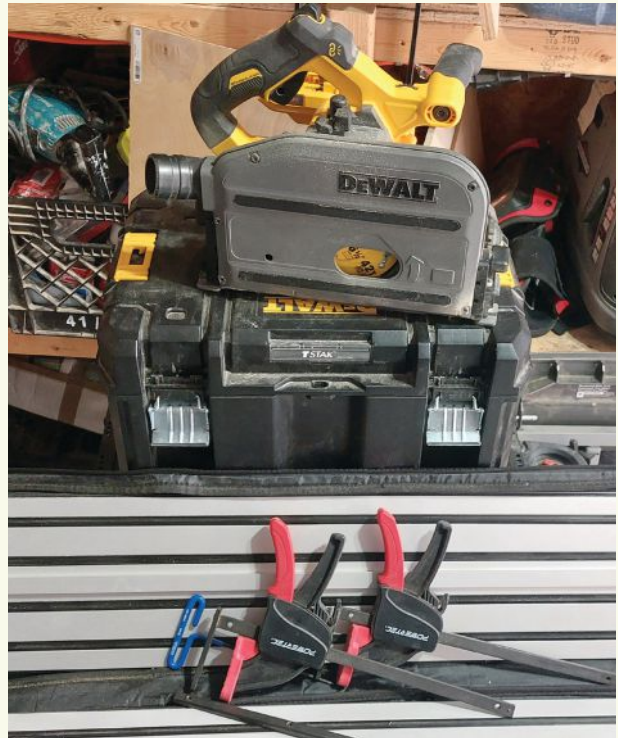
But every now and again, something will end up in the shopping cart. Before I commit to the purchase, two restraints keep me (mostly) from having an apologetic conversation with my wife. First and most important is it needs to be efficient: Is this tool an improvement over what I have, or will it help me do a job better and faster? If so, then it makes sense. Having the right tool to do a job correctly is satisfying, especially if you've had to make do for a time with what was on hand.

My next restraint is that it needs to be a good deal. I hunt for a sale like some people hunt big game. I have tracked a price for a targeted item across time and geography looking for just the right spot to make the shot. Full price or without free add-ons does not taste as sweet.

Even with those points satisfied, the tool may still be right at the pain threshold or "scold" threshold for cost. (Your situation may vary.) That is what makes it a splurge purchase. I could get something similar for less, but I stretched to buy what I liked and thought would be a better quality tool.

My splurge was a cordless track saw, a DeWalt DCS520ST1 with the tracks, clamps, and carrying cases. Several colleagues owned track saws, so I had the opportunity to try out a number of different brands. The saws all delivered as promised, able to break down finished panels, sheet goods, or prefinished doors with a clean, dead-straight cut. The cost with the needed track and such was in the \$1,000-plus range—not an impulse buy.

Then a job came along to renovate a restaurant. I would be building shelving, a bar, booths, and more, all on site, with a lot of finish-grade plywood. Most of this work I would be doing alone, so being able to create all of it safely, cleanly, and accurately was vital. The search for a sale began, and I am happy to report



The DCS520ST1 with all its accessories was a financial stretch for the author, but it facilitated one project and led to success on many others.

that the tool was just what was required for the job. Having had a heated physical disagreement with a table saw in the past, I look on my track saw as a real savior for doing accurate work on sheet goods.

In that spirit, I reached out to a few frequent JLC contributors to see what tools they splurged on. I also asked about the reasoning behind the purchase and if it was worth it, because not all tools we buy end up being what we hoped they would, as I know too well. It's one of the reasons my garage has never seen, and will never see, a vehicle.

Marc Forget is an associate editor at JLC.





↑ **Aron Jones**, co-founder of Big Dog Construction on Grand Manan Island, New Brunswick

My first gut-wrencher of a purchase was a hammer. I purchased a Dead On titanium-head hammer (I think in 1999, for around \$220). It was a splurge at the time. I was experiencing occasional elbow pain and decided to go for it. It changed the way I look at tools. It didn't necessarily make me more productive in the short term, but it brought a little bit of joy to the day. I would now argue that it gave me long-term productivity, or at least started me thinking about longevity.

↓ **John Carroll**, author of *Working Alone* and builder in Durham, N.C.

I generally go for the equivalent of a Honda or Toyota when I buy tools. I want a safe, reliable, and durable tool but don't care about mahogany handles, electronics, and so forth.

I sometimes splurge on masonry tools and equipment, though. The Europeans know a thing or two about masonry. They practice it far more extensively than we do, and they've been doing it for a lot longer—over 2,000 years longer. I recently bought a small concrete mixer from Imer, an Italian company. I could have gotten one the same size for about \$300, but I paid \$900 for the Imer.

It was well worth it. We can take the Imer off its stand in a minute or two. We can then easily load up the two parts in the back of my small pickup truck. This makes it easy to transport and then set up close to our work. It's well-designed, and it's a pleasure to work with. And, I'm pretty sure it will last for decades.

PHOTOS: ARON JONES (HAMMER); MATT NAVEY (MIXER)



Worth
it!

→ **Emanuel Silva**, owner of
Silva Lightning Builders in
North Andover, Mass.

The one “splurge” I can think of is the Caravan pop-up canopy my wife bought me years ago. I told her I wouldn’t use it and, if I set it up on site, people would drive by and think it was ridiculous or ask when the hot dogs would be ready. She spent around \$200, but that was at the end of the season and over 20 years ago. I thought it was nuts, but I put it in the van to make her happy.

One day, I did set it up, and now I can’t live without one. Rain or shine, it is one of the first things that I take out of the truck when I am working. With all the days it has made it possible for me to work in bad weather, it has paid for itself. Good-quality canopies last 5 to 7 years with lots of use. If one wears out, I make sure to get another one right away.



Not
worth
it!

Mark Clement, author of *The Carpenters Notebook*
and remodeler in Ambler, Pa.

In the late '90s, I decided to get a fancy drill for all the deck work I was doing. I spent extra money to buy a Panasonic 12-volt cordless drill kit with two batteries and charger. I had to special order it, and it cost about \$400. It was okay at first, but once I dropped it into the mud, chuck first, it never worked right afterward. Then I went and spent more money to try to have it fixed, but it still wasn't right. What a waste. It was a tool that would have been better for a shop where it would've been kept safe, away from the cruel world. Not worth it! Still makes me mad thinking about it.

PHOTO: EMANUEL SILVA

Toolbits

by **MARC FORGET**

At *JLC*, we continually receive press releases about new or evolving tools. I also go out into the wild and find out what tools people are talking about on site and what is on offer at local stores or online. While we can't review every tool we hear about, we decided to highlight a few that have caught our eye and put them out there for you to think about. Here is a small assortment of such tools, a couple from small companies leveraging 3D printing to solve problems and the others from larger companies trying to build a better mousetrap for the tradesperson.



At a tool expo this past summer, I came across a Crescent Tool Siterunner three-shelf folding job cart. I like to keep my sites well organized, and a rolling shelf that can hold supplies or act as a job cart while I'm working would help me do that. In addition, it folds up, making it easy to transport and store. Features include a T-channel accessory rail to hang tools from and 5-inch casters, two of which lock and two swivel. The cart can hold 100 pounds per shelf but weighs a manageable 43 pounds empty. It costs \$300. crescenttool.com



When I installed cabinets, I sometimes needed to drill holes for shelf pins, cabinet hinges, or hidden push-to-open pins for cabinet doors, on site. There is no chance for a redo, so accuracy is vital. Festool has come up with the MB40 mobile drilling attachment to solve this problem. The company promotes the attachment for use both on the jobsite and in the shop for drilling 90-degree holes up to 2 inches wide in panels or on the edges of cabinet boxes.

If you've done this work more than once and think you'll do it again, this accessory might be worth a look. The MB40 comes packaged in its own Systainer case with 3mil and 5mil bits and base and guide rails. Cost is \$270. festoolusa.com



All the major tool manufacturers sell toolbox systems for storing equipment and transporting it to the site. With a few exceptions, these are all open boxes that we pile our drills, guns, and so forth into, along with their accessories. We then rummage through the boxes to find what we need (or not) and then dump everything back in at the end of day.

10-Spot Tools looked at this and created 3D-printed inserts that fit into the boxes to keep tools and bits organized and accessible. These inserts are available for most types of storage systems and for the more common tool groups, with more options added regularly. Prices vary depending on the insert. 10spottools.com



A colleague had this tool on site for a job we worked on together some time ago. Miter clamps that pin together miters have been around a long time, but they can be expensive and leave too large a mark on a workpiece. His clamps were different, though. They sported Dark Horse Design replacement pads, which fit onto spring clamps made by some common brands. The pins that hold the workpiece make a mark no bigger than a nail and are replaceable as they wear. At \$15 a pair, the pads are not hard on the wallet.

The company is pivoting to selling 3D printing plans instead of the product as international shipping has become more complicated. It's another example of what 3D printing and a bit of creativity can provide for us on site. darkhorsesdesign.ca

PHOTOS OF TOOLBOX INSERTS AND SPRING-CLAMP PADS BY MARC FORGET

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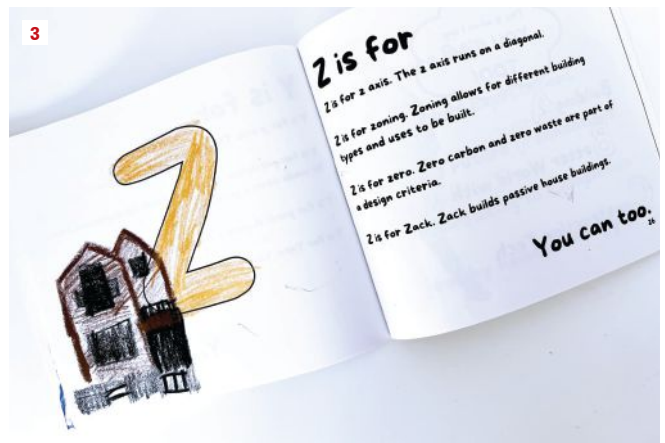
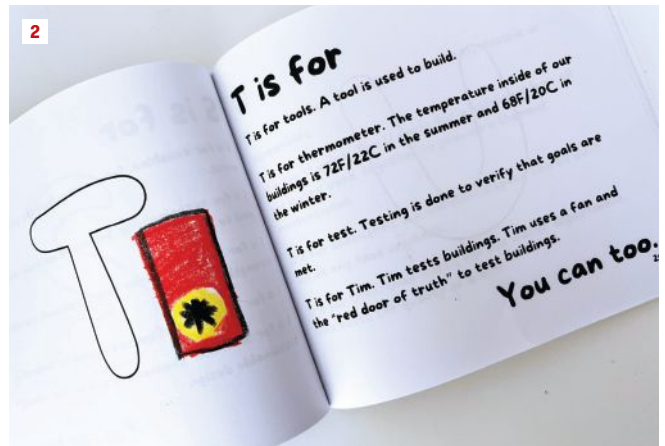
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(1) Mailed outside-county paid subscriptions/requested.	10,261	9,874
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You Can Too!

by JLC STAFF



At first, *You Can Too! The ABCs of Construction Tech* by Mark Wille (available at amazon.com) seems like any number of kid's alphabet books following the familiar format "A is for ..." and so forth. In this case, each letter is drawn in black and white and is accompanied by the author's riff on what each letter stands for in the world of construction. For Wille, who wears hats at the Build Show, Passive House Accelerator, and Illinois Green Alliance, that world is full of high-performance homes.

To most adults we spoke with, the book seems like a good idea but, they speculated, might be a bit too plain for older kids, and—with terms like "biophilic design," "Manual J," and "net zero"—a bit too complex for younger kids. Clearly, we adults didn't see the creative possibilities that Wille envisioned and were realized when Owen (5) and Emmett (10) got their hands on the book.

"You can too!" is an avowal that the readers can create this book, too. And each page affirms that they can grow up to build, renovate, and design houses. The book is a blank slate for the reader's artwork, and the accompanying words become ideas to explore. Like, "What exactly is 'the red door of truth?'" Emmett asked. That question and "What's a 'passive house?'" required an online search with his mom that led to an article by Jake Bruton on JLConline.com and a news report about architect Greg Chasen's house in LA that

Owen Fuchs brings energy and light to "E" (1), while his brother, Emmett, draws his first blower door (2) and explores a passive house that survived the Palisades Fire in California earlier this year (3).

survived the Palisades Fire earlier this year.

"The book sparked whole conversations," mom and *JLC* art director Alice Ashe explained. "It's not a book we could just hand to our children without some guidance. But once we jumped in, the whole family learned from it."

PHOTOS BY ALICE ASHE; ILLUSTRATIONS BY EMMETT AND OWEN FUCHS

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