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IN THIS ISSUE

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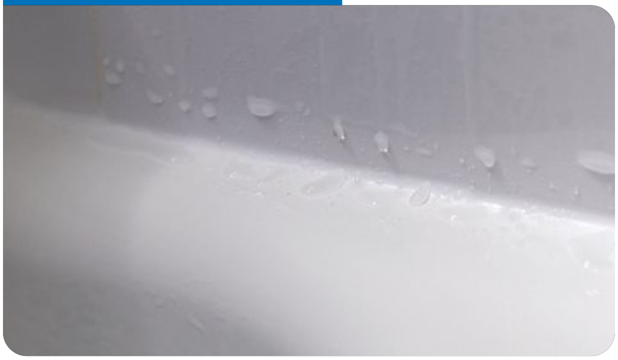

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ON THE COVER: Gary Striegler from Fayetteville, Ark ., planes maple boards for a custom front-entry door project. Photo by Gary Striegler. See the story on page 35.

PHOTOS: TOP, RICK MILLS; BOTTOM, MARK CLEMENT

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Fitness for the Jobsite

by **MARC FORGET**

Push your palm flat on a wall or table and extend your arm straight. Hold for 10 and switch arms **(1)**. For the calf stretch, place your foot against the wall and straighten your leg. Hold position for 10, and then release slowly and switch to the other leg **(2)**. Both stretches should be repeated three or four times.

The physicality of the trades is a point of pride for most contractors. We mark out the day by what we moved, the number of steps we took, and the hours worked as much as the money earned.

When I started working construction, I was struck by how broken the bodies of the older men I was learning from were: hips ready for replacement, knees shot, and backs doubled over from the mileage of many years of work.

If you are getting your 10,000 steps in before lunch, moving heavy materials around jobsites, and perhaps climbing through roof trusses like an acrobat with a toolbelt, you may believe you are getting all the fitness training you need. The issue is that those are deconstructive activities, which are a stress on the body, and too much stress can cause problems down the line. A fitness routine, however, is a constructive activity, which prepares and maintains your body to handle stress.

According to OSHA, 3.8 out of 100 people working in construction jobs will suffer from repetitive strain injuries during their career. With more than 8 million people employed in

PHOTOS ON PAGES 8–10: MARC FORGET

For the back stretch, when you touch your toes (or get as close as you can), try to keep your legs straight. When you release, slowly raise your arms above your head (3). When I do the neck stretch, I hold the chair on the stretched side and leave the arm loose on the side I lean toward. Hold for 10, release, and repeat (4). Do all of these motions slowly, breathing as you go. If you feel a sharp pain, stop right away and adjust until the pain is not present.

the industry, 6 million of those directly in the field, that is a lot of people who want to work but are unable to. This should not be taken as a lecture on what we are doing wrong. We take safety much more seriously than when I started 20 plus years ago, and the declining number of deaths and serious injury back that. Our next goal should be to help ourselves in other ways.

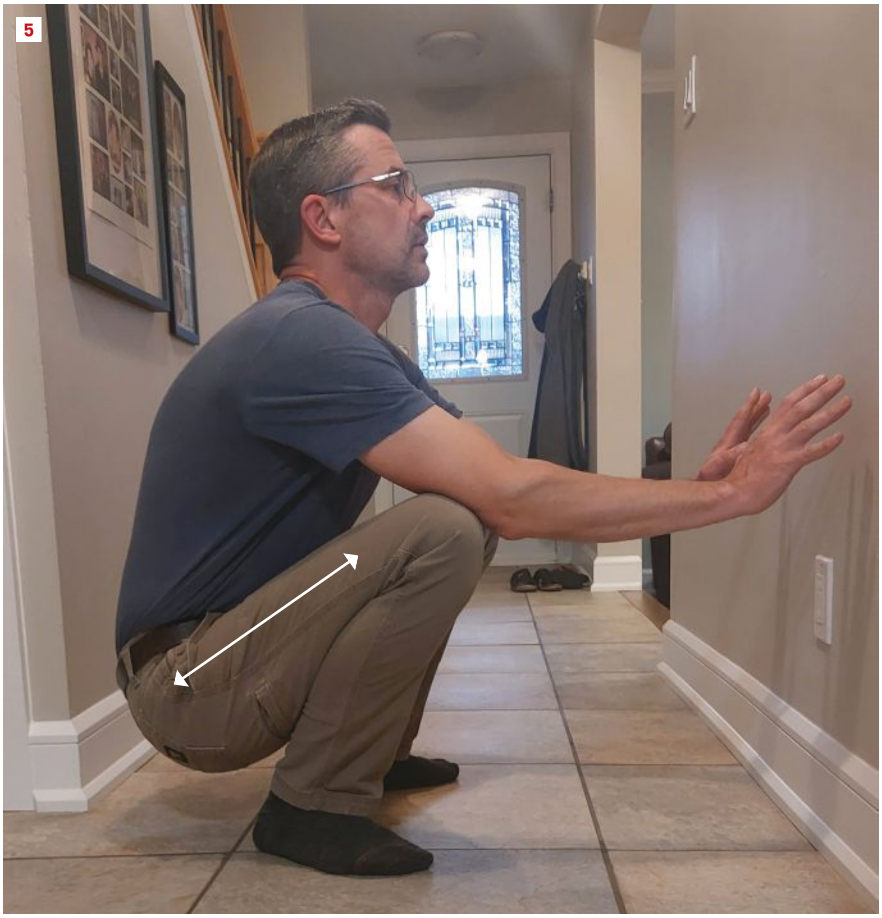
While working on this article, I spoke with Mark Clement, a *JLC* contributing editor and former editor of *Tools of the Trade*. (See a few of Mark's favorite stretches on page 11.) He is serious about body care in the trades and helped me form the idea of constructive and deconstructive activities. He also pointed out that the habits around fitness and body maintenance are not built-in for most people. If you didn't play organized sports growing up or experience the direct relationship between good diet and exercise and performance at a task some other way, why would you be thinking about body health and how it affects your workday? Just as you created habits to efficiently frame a house or shingle a roof, you can learn and form habits to care for your body.

We learn by paying attention to results. So pay attention to how you feel. If your back feels stiff most days, try a stretch a few times and see if that helps. If your energy crashes by the afternoon, try a different lunch or an afternoon snack to carry you through. By listening to your body, you can form a habit that improves your outcome.

Your body is your most important tool. All the tools in the truck and years of experience on the job will not get the work done if you can't move. If you want a long-term career, not just a short-term job, you will need to create habits to support that goal.

My Daily Stretch

I do not have a background in sports or fitness, so the idea of listening to



While you are doing the squat, you will feel the muscles in your legs, glutes, and back working. Try to keep your arms straight out and your back in a vertical line, too. I am not there yet all of the time, but practice will lead to better results **(5)**.

my body did not come naturally. As the aches started to build up and affect my production, though, I had to pay attention. What I share here is not a full wellness routine—that would be a much longer article and not my expertise—but one that works for me. I took each of the main pinch points that my body had and formed a habit that helped counter each one. Your issues may be different, but the idea, much like finding a more efficient way to organize your work, is to see a problem and find a way to deal with it. The photos on these pages show the stretches I do daily to deal with my particular problems. I describe them in a bit more detail below.

Forearms. This stretch helps prevent my forearms from tightening up so much that holding tools and moving materials cause pain and numbness right to my finger tips. I can also do this stretch in the van on the steering wheel or dashboard while in traffic to release tension **(1)**.

Calves. My muscles used to get so tight from working on a ladder or being on my knees that they would fall asleep and go numb when I went to bed. By putting my foot on a wall and slowly bending my leg, I could prevent a blinding charley horse in the middle of the night **(2)**.

Back. I am not the largest of men, so my back on this slim frame takes a lot of abuse. For this ache, reaching down and touching my toes gives me the mobility I need. A few slow and full movements of this stretch with my arms extended up to the ceiling and then down to the floor are usually enough to work out any built-up knots **(3)**.

Neck. According to my massage therapist, everybody keeps their stress in a particular part of their body. For me, it's my neck; the stretch shown is one I was taught to use to work that tension out. Sit up straight in a chair, grab the chair with one hand, and lean over in the opposite direction, keeping the other arm loose. Hold this to a count of 10 and then repeat for the other side **(4)**.

Hips and lower-body muscles. My hips and parts of my upper legs started to complain—it's fun getting old—so I now do a squat that has helped. It is supposed to open up the pelvic area, work major lower body muscles, and improve balance, as a bonus. With your feet flat on the floor, shoulder width apart, lower yourself to the floor while keeping your back straight. Then rise up slowly and repeat. (Don't forget to breathe.) At first, you may need a wall in front of you for support but, after some time, I was able to do this without tipping over **(5)**.

These exercises have helped me, but your pain points may not be the same as mine. Pay attention to your discomfort and then create a habit that deals with it. Do your research and ask trusted people for advice. Consult your physician. Just as you learned better ways to hang a door, try different things that will help your body work better and feel better as you age. You have time to start habits that will extend the length and quality of both your career and your life outside of it.

Marc Forget is an associate editor at JLC.

Jobsite Workout by Mark Clement

Carpentry and construction work loads the body asymmetrically: joists on one shoulder, nailer in one hand, climbing through joists, etc. Purposeful exercise is symmetrical loading, and it flips different switches in your body. Here are a few of the exercises that have worked for me during my career behind the saw.

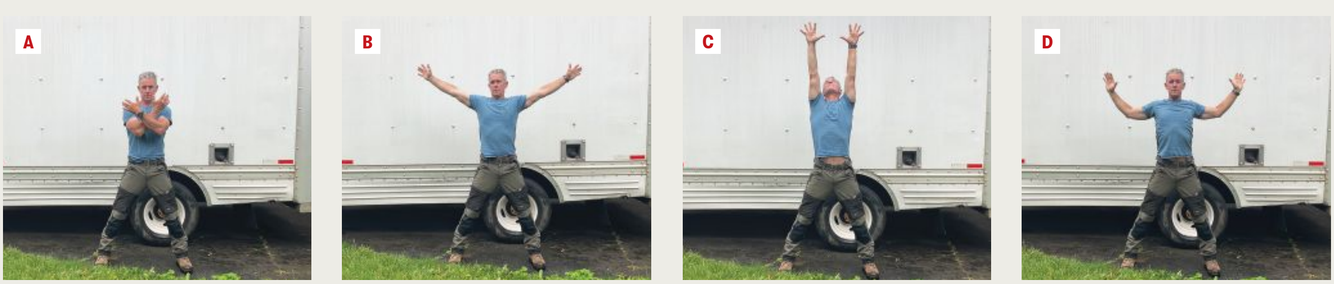
Lower Back, Shoulders, Whole Body

Zero other stretches have un-crunched my spine as well as a nice hang. Use a stepladder or drywall bench. Find a ceiling joist or similar, grab with arms tensed and bent. Knuckles facing you. Slowly let your body settle and feel your spine elongate **(A)**. Slowly. Bend knees. Twist left **(B)**, twist right **(C)**. If you feel inspired, try a pull-up **(D)**.

Core Exercise, Shoulders, Neck, Back

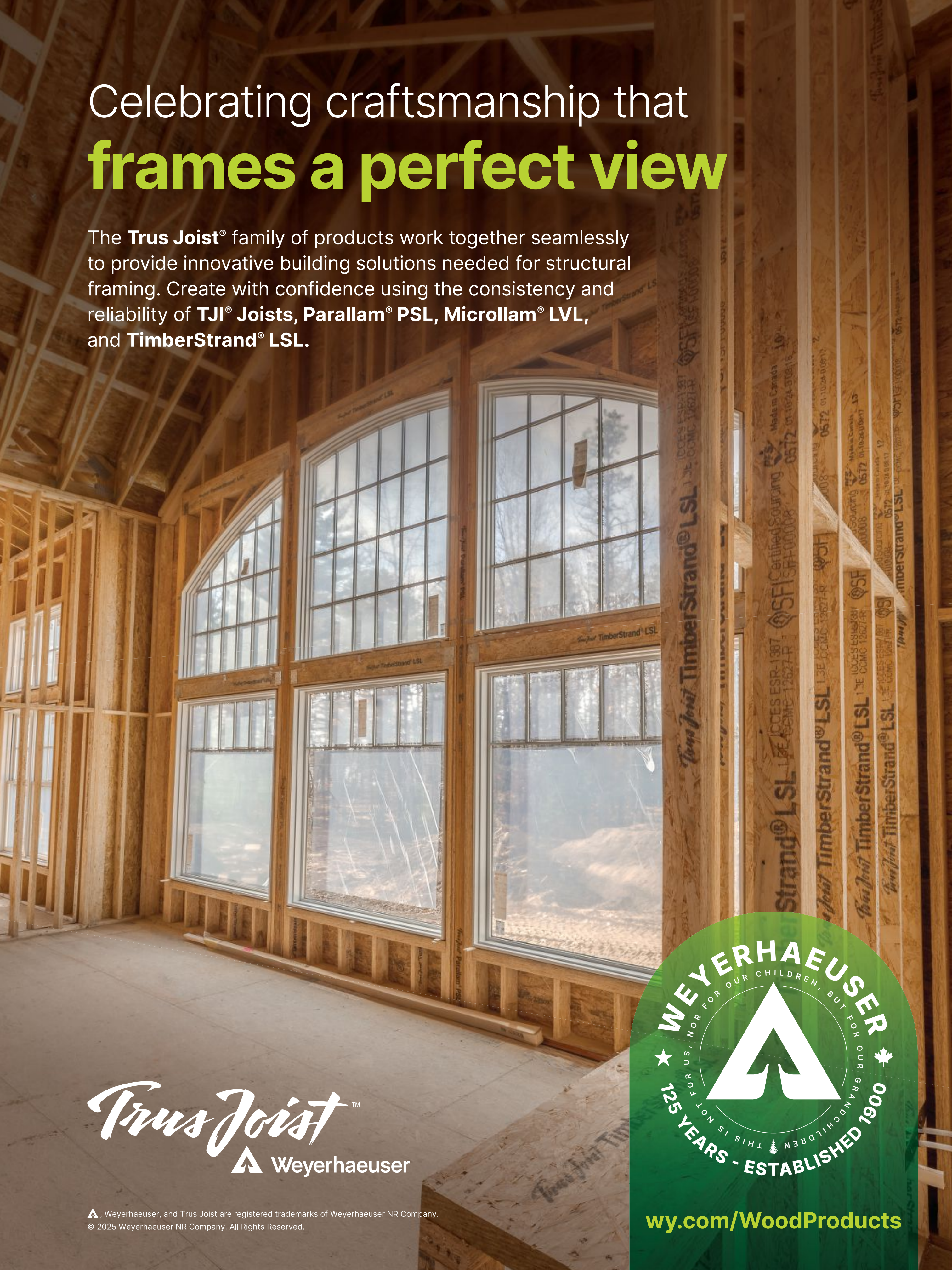
This exercise is also a stretch. Start with your knees bent and back parallel to the ground, suspending the block above the ground **(A)**. I keep my back straight and let the block hang **(B)**. This "opens up" both shoulders. Then lift the CMU in an arc up to your chin **(C)** and press it above your head **(D)**.

Blood Flow, Stretch, and Breathing



PHOTOS ON THIS PAGE BY MARK CLEMENT

I learned this from an old-school workout called P90X. If doing this a few times takes more than 30 seconds, I'll eat my hammer. But, man, it gets blood flowing. Hold your hands in an X across your chest **(A)**. Breathe in. Swing your hands out **(B)**, slowly, and raise them over your head **(C)**. Tell me your hands don't feel different after a few of these. Really try to reach up. Bring your arms down. Pretend you are trying to rub an imaginary wall behind you with your elbows **(D)**. Breathe out.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Q My mason has always used rope for weeps in brick veneer, both at the base of a wall and above an opening where there is through-wall flashing. I heard that the rope can rot over time and then block the holes. Is this true, and is there a better alternative?

A *JLC* reached out to a couple of contributors for their thoughts on rope weeps. This is what they had to say.

John Carroll, author of Working Alone*, responds*: Using a rope wick is an old technique, with some advantages. With it nailed vertically up the frame and run to an open head joint (the vertical space between the bricks at the bottom), it will continue to wick water out even if the mason drops some mortar down the wall cavity. The rope also does not provide the open door for insects to enter behind the brick that open head joints do. I've never heard of a problem caused by the rope clogging up as it decayed. While rope wicks are better than open head joints, I prefer using plastic weep vents. These are corrugated—which helps to keep bugs out and allows moisture to move from the cavity—and they are easy to install.

Doug Horgan, vice president of best practices at BOWA, responds: The Brick Industry Association (BIA) states that rope weeps (wicks) are "not preferred" and points out they should be installed closer together than open head joints as they don't work as well (see references, below). I once saw 2 inches of water dammed up behind rope weeps when I visited a site under construction during a rainstorm. We removed the rope weeps from that project and haven't used them since. Open head joints are the simplest and cheapest way to go, but we normally use a manufactured weep. Typically, it's a corrugated or woven material that is a similar color to the brick, so it does not stick out visually in the wall. In another setup we use frequently, we wrap strips of the drain-mesh material we have on site down over the through-wall flashing to leave a small open space right on the flashing that drains well and is inconspicuous.

For more technical information on rope weeps, download the PDF "Water Penetration Resistance - Design and Detailing," *Technical Notes 7*, November 2017, from BIA, at gobrick.com. Also see "Keeping Brick Veneer Walls Dry" by Jerry Carrier, *JLC* Nov/99, at jlconline.com.

1

2

Rope weeps are an older technique for managing moisture behind brick veneer (1). According to Jeff Tew, director of technical and training at Westlake Royal Stone, they're not recommended for MSV (manufactured stone veneer). On one job he inspected (2), water would have soaked the ropes, but the flashing and weeps would have then channeled the water into the framing instead of away.

PHOTOS COURTESY JEFF TEW

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Windows in Showers

by **DOUG HORGAN**

Clients often like having natural daylight in a shower, but subjecting a window to constant wetting presents some obvious risks if the waterproofing isn't implemented well.

Double Trouble

In a shower window, we have two main "loads" to deal with: splashing water and condensation. Because both tend to concentrate the moisture at the bottom of the window, we need to provide near-perfect waterproofing there.

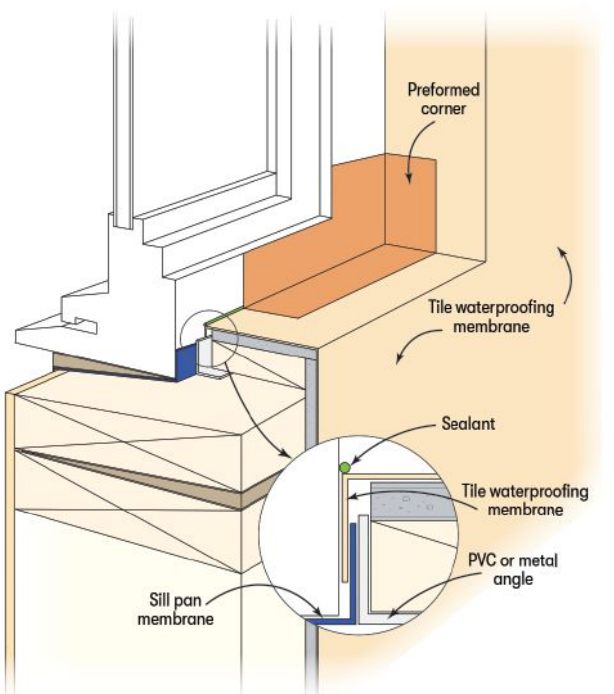
Our first line of defense is to reduce the bulk water load, which we do by installing a glass window cover to block most of the direct spray and splashed water. Most often, we use a piece of shower glass that matches the regular shower enclosure glass and have them both installed by the same subcontractor. We hinge these glass covers so the owners will have access to the windowpanes for cleaning. A shower curtain can also work. A plain curtain is typically not fancy enough for most of our projects, but that's what we had in my last house.

For condensation management, three strategies can help: First, a higher performing window will be much warmer on the inside, which in turn will reduce the amount of condensation forming on the inside surface of the window glass. Second, we prefer using a fiberglass or vinyl window frame that isn't vulnerable to peeling paint or wood rot. Last, we strive to put an exhaust fan with a timer switch, or an ERV inlet port, inside the shower to help it dry out quickly

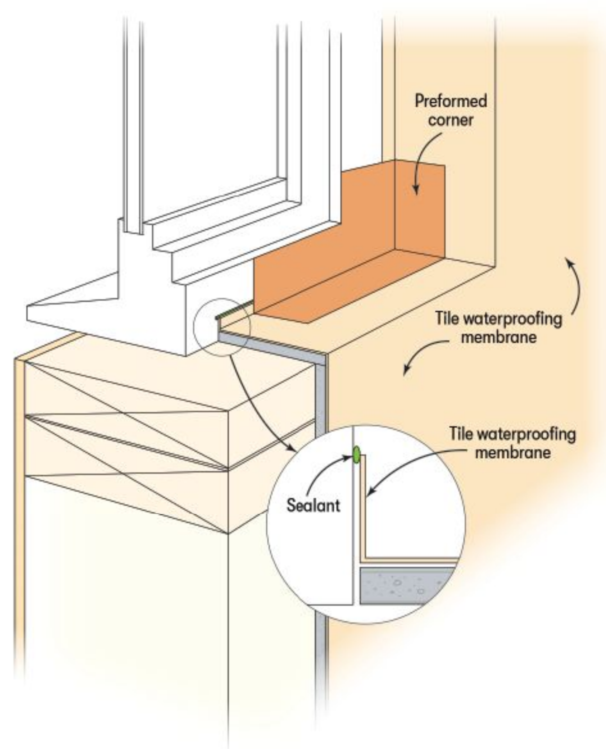
Windows in showers are valued by many clients, but they present a moisture risk from both splashing water and condensation. That requires multiple lines of defense.

PHOTOS BY DOUG HORGAN; ILLUSTRATIONS BY OLA KWIATKOWSKA

Tile Waterproofing for New Window



Tile Waterproofing Around Existing Window



In new construction, the sill pan membrane is turned up onto a PVC or metal angle. The tile waterproofing membrane is lapped over this edge of the sill pan when the back dam or interior jamb is installed. Finally, the joint between the window and the waterproofing membrane is caulked before tile is installed.

To waterproof an existing window (which may not have a sill pan), the best that can be done is to turn the tile waterproofing up onto the window, bedding the edge in a bead of sealant.

after use. The faster the condensation evaporates, the less damage it can wreak on the window or its opening.

Having done all that, it's still prudent to assume there will be significant water on the inside of the window at times, especially when it's exceptionally cold outside or when someone decides they need a 30-minute shower.

Enhanced Waterproofing

When we install any window, we slope the sill and use flashing tape to make a water-managed "sill pan" that directs any water in the rough opening to the outdoors. Inside the shower, we typically waterproof the walls up to above the showerhead. With a little bit of forethought, we can install these two water management elements—the waterproofing membrane on the walls and the sill pan—so water has to go in or out and can't get into the framing to cause damage.

Because the tapes, sealants, and shower waterproofing may not be compatible with each other, and because sticky adhered connections are inherently less reliable than overlaps and gravity, we've come to prefer to tuck the shower waterproofing down over the raised back edge of the window flashing pan. While this does need to be explained (over and over) to the folks with the tools on, once understood, it's relatively easy to do, and it's hard to get wrong in a way that will leak. This is our standard for new construction when we can control the installation of the window pan and the shower waterproofing.

However, in many cases we're remodeling an existing space and the windows are not being removed, so we are stuck working with whatever water management is already in place. This is much riskier and requires perfect workmanship on our part to get right. We always assume there isn't an intact window flashing pan we can turn up—a good assumption since we've rarely seen one. Typically, where there is windowsill flashing, it's usually well short of being able to extend out and upward, and it usually has holes, cuts, missing areas, or other deficiencies. Given these existing shortcomings, we do our best to seal the shower waterproofing to the inside of the window.

Close attention to detail and careful inspection before installing the tile do not offer guarantees but will give us the best chance the membrane will stick for years to come. One step helps: We usually remove extension jambs to eliminate leaks through the seam between the window unit and the extension. This gets rid of a wide, flat piece of wood at the bottom of the window where all the water ends up. We replace the extension jambs with tile or stone, or with synthetic trim, such as solid PVC, which will hold up to lots of water exposure.

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

At an existing window in a new shower, the author's company installs Kerdi membrane, lapping it onto the window (2). This application is inherently risky, requiring near-perfect workmanship. The author identifies two instances (3, 4) where the membrane is not sealed and will need extra attention from the crew.

One of the last components to install is the first line of defense against splashing water: The author's company has the shower glass subcontractor fabricate hinged glass panels to cover the window (5, 6).

Prebuilding Exterior Trim

by **EMANUEL SILVA**

This window replacement project, like most of the jobs I do, entailed repairing part of a house, not a full remodel. But unlike most of my clients, who hear about me through word of mouth, the homeowner learned about me from a *JLC* article I wrote.

The project was just big enough that another set of hands would have been nice to have for some but not all of it. I work alone mostly, though, so I've learned to be smart about how I organize the work, the jobsite, and my time. As part of my strategy, I try to break down the job into small pieces that I can manage by myself. On this project, one way I did that was by prebuilding the exterior window trim as one unit. This method saves a million trips up and down the scaffold, measuring, cutting, and installing parts one by one, and gives me better control over the joints and final finish.

The original window was one piece, and the client wanted its replacement to look similar **(1)**. By using three windows but trimming them out to look like a single unit, I could both manage the install on my own and satisfy the client.

The client also wanted the trim to match what was on the rest of the house as closely as possible. That meant using wood on the exterior and reusing the old trim on the interior. I chose a clear Spanish cedar from a local mill shop to provide as much rot resistance as possible without going over the budget.

Because the mill shop didn't have 1x5 or the exact profile of the shingle stop (also called a back band), I needed to modify the lumber **(2)**. I ripped 1x10 to make the casing and the header. To match the other windows, the profiled casing I bought needed to be narrowed and part of its profile beveled off. Then,

The author removed the old window **(1)** and replaced it with three new units. He repaired the old framing to be level and plumb or replaced it, if needed. With a new batch of cedar, he modifies, glues, and seals all the trim pieces for the window before installation **(2–6)**. After gluing and screwing the sill together, he bevels it to shed water and cuts a saw kerf in the bottom for a drip edge **(5)**.

PHOTOS BY EMANUEL SILVA

By making a mock-up of the sill and casing, the author is able to draw accurate lines to indicate where the components will be installed **(7)**. Using those lines, he marks the header and sill for spacing and final lengths and then sizes the vertical parts that need to be cut **(8, 9)**.

to make the sill, I ripped and glued up 1-by stock **(3, 4)**. I left all the pieces long to allow for any final adjustments. Once I ripped, sanded, and glued up the pieces, I painted them with an oil-based primer **(5, 6)**. I put on two coats because I didn't know how long it would be until the homeowner brought painters in.

I made mock-ups of the trim corners to check fit and mark lines on the house for final lengths **(7)**. After setting the header on spacers across the windows, I marked it for length and drew placement lines for the verticals. I took the same steps with the sill **(8, 9)**. From those lines, I measured the lengths for the vertical pieces. With the measurements and the marks on the sill and header, I was able to make just one trip to the miter saw and cut all the material.

While I was measuring, I noticed that the wall was built-up close to the windows. Because of the flashing tape and the window flange, the trim wouldn't sit flat against the wall. To allow for that, I cut a ⅛-inch rabbet on the side that would be against the wall so the trim and the outside edge of the window would be flush when installed.

When I cut all the parts to size at once, I can predrill for pocket screws, glue, and fasten the joints tight **(10)**, which I can't do if I do one piece at a time. I double-check the layout, paint the cut ends, and let the glue cure before installing the assembly. I make sure the pump jack is set correctly and do a final check for square before I set the assembly on the pump-jack deck.

I place spacers above the windows to align the trim, and then I lever the unit in place **(11)**. With the trim hung from the spacers, I can check the spacing at the sides and middle. As I fasten the assembly with headless screws, I adjust for plumb.

Then I install the shingle stop (back band) **(12)**. On this project, I used the new profiled casing I had modified to match the existing detail on the house. I

The author cuts the parts to length, pocket-screws them, and glues them together in one step. Note the rabbet cut on the back of the trim to allow for the buildup at the window edge **(10)**.

11

12

13

With planning, the author can place the finished trim assembly on the wall **(11)**. With it hung on spacers at the top of the window, he checks it for plumb and fastens it with trim head screws. Before he ties in the cedar wall shingles, he fastens a shingle stop that he had modified to match the existing one **(12, 13)**.

did this a piece at a time to hide some of the screws on the flat stock and to ease transport. The other screws I filled with wood plugs. I then tied in the shingles and prepped for caulking the gap I set between the windows and trim **(13)**.

In my years of working alone, I have found that by managing jobs as I did this one—prebuilding where I can, keeping a clean site, and breaking the job down into steps and completing each one before moving on to the next—I can keep the jobs progressing and organized and achieve the quality of work I'm aiming for. My work comes from referrals, so I take the time needed to do it right. Doing things like premaking parts helps me control the quality of the finished product.

Since I completed this job, the homeowner called me back to do more work, which is the best compliment I can get. I also found out that he hasn't had the final painting done a year on, so I'm glad I took the time for extra primer coats and caulking. The window still looks as good as the day I finished the job.

Emanuel Silva, a JLC *contributing editor, owns Silva Lightning Builders in North Andover, Mass. He can be reached at silvalightningbuilders@gmail.com.*

The Reluctant Saleperson's Approach to Selling

by **DALE NIKULA**

I went into the construction business mainly because of my passion for building. I love walking through a building under construction or being remodeled and visualizing what it will eventually become. I did not go into construction to sell but soon realized that I couldn't build unless I sold. So, over the years, I spent a lot of time and money working with sales coaches to learn techniques to sell and close and, through practicing and going on tons of sales calls, I became very good at both. Don't get me wrong, I loved the dopamine rush when I closed a sale (especially if I had "beaten" my competition) and that feeling of winning and being a winner. But I hated losing a sale, because it meant that I had failed and had been beaten. And that feeling became almost unbearable if I lost several projects in a row.

It wasn't until late in my career—when I came across a different way to approach selling (presented by author and speaker Michael Neill)—that I started enjoying the experience of selling, not just the experience of winning the sale. It's this approach that I want to share with you, as I assume if you are reading this, you, too, are struggling with making or enjoying sales.

A Different Approach

A common definition of selling is "the act of persuading someone of the merits of a product, idea or service." This requires learning techniques to persuade prospective clients and then using those techniques on sales calls without prospects realizing that you're trying to persuade them. Just thinking about this makes me nervous and stressed, as this never became second nature to me and always felt like I wasn't doing something right or like it was forced and phony.

But what if we change the definition of selling to "getting to know someone and then seeing if and how you can help them"? This doesn't require any techniques or a list of 10 "penetrating" questions; it simply requires having a genuine interest in helping someone and treating them as you would a good friend or family member (one you like!). So instead of techniques, you use curiosity, compassion, caring, and honesty to learn about potential clients and why they want to do the project. Think of how you would act if they were good friends asking you to remodel their home. Wouldn't you want to learn about their needs and expectations to come up with the best solution for them, whether that meant you doing the project or not? Wouldn't you want to be transparent about how the experience was going to go and what the potential problems could be, so that you didn't jeopardize your friendship? Wouldn't helping be much more important than selling?

Approaching sales this way creates a connection between the other person and me, which in turn creates trust, which is one of the most important factors in successful selling. Not that this will happen all the time: As with people in general, you are not going to connect with every prospective client you meet. Who you are and what you offer professionally won't be a good fit for some people, but using this approach will help you realize that quickly, so that you can politely decline the project instead of using some technique to try to force a square bolt into a round hole. Indications that you are creating a connection and trust are when prospective clients are relaxed and not rushing the meeting, and they ask questions, they ask for advice, they use humor and respond to your humor, and they share concerns and past bad experiences.

What About Objections?

Don't salespeople need techniques to deal with objections? Michael Neill's take on objections is that they are a form of resistance to what you are offering, a way of disengaging from the process, and I agree with that. Most

I never enjoyed selling. It was something I had to do so I could build.

objections are statements, such as "The price is too high" or "That is way over my budget," that are intended to dissuade further conversation. These are different from concerns voiced as questions, such as "Why is the price so high?" or "Is there a way to get closer to my budget?," that are intended to elicit a response and move the process forward. Objections are a good indication that a connection is not occurring, so employing some technique to try to overcome them only delays the inevitable. On the other hand, questions, as honest requests for help, simply require an honest answer in return.

There are some techniques that you can practice that help with this approach, the most important being active listening. I define this as the ability to listen without assuming what is going to be said or formulating a response before the other person is done speaking. Again, maintaining the mindset that you are there to help will make active listening much easier. Additionally, using breathing exercises to calm yourself prior to the meeting will help you remain calm, which in turn will help you focus and stay present.

A significant benefit to adopting this selling approach is that failing to close a sale is less discouraging because you are no longer selling to win but to experience the process. And as long as you act out of a genuine desire to help, not closing is not failure but recognition that you and your service are not a fit for everyone.

I only regret that I didn't discover this approach earlier in my career. If I had, my company would have been even more successful, and my selling experience, a lot more enjoyable.

Dale Nikula owns Encore Construction in Dennisport, Mass.

Process vs. Purpose: The Key to Accurate WIP Adjustments

by **MELANIE HODGDON**

A recent discovery within a client's file reminded me of how often I encounter errors that stem from a focus on process or procedure without adequately conveying the intended purpose of the action. Let me explain.

Companies seeking to improve the accuracy of their financial statements often make WIP (work in progress) adjustments. The intention is to counteract incoming dollars that are counted as income but as yet have no offsetting costs. A typical example of this would be receiving an "at signing" payment of $50,000 on a job that isn't scheduled to begin until the following month. Including that payment as income in the current month skews the income (and, accordingly, the gross profit and margin) for that month.

In a perfect world, if jobs are (a) sold with a consistent markup, (b) produced reasonably closely to estimated costs and schedule, and (c) invoiced in accordance with the matching principle (see "The Matching Principle," facing page), then the achieved gross margin should remain fairly consistent between reporting periods (months).

The purpose of WIP adjustments is to ensure that financial statements accurately reflect a company's true financial position.

P&L With Margin, Example A

But, since we all know it's more important for cash flow to BEBO (bill early, bill often), most contractors who are selling fixed- or contract-price work front-load the payment schedule. This practice can skew the numbers significantly depending on how many invoices vs. job costs are included within a given period. It is not unusual to see something close to Example A (see top of facing page).

P&L With Margin, Example B

Now look at Example B (below Example A on facing page). The purpose of WIP is to correct this situation by adding or deducting "income" to eliminate unearned income. Therefore, once the WIP has been entered, one would expect there would be far smaller changes in margin value among the reporting periods. In other words, the P&L would look more like Example A.

When a client reports that they are performing monthly WIP adjustments, and their P&L by month with margin looks similar to Example B, I can be pretty sure that the WIP adjustments are not performing their intended purpose. If I dig back far enough, the cause is almost always an emphasis on process without understanding purpose. The bookkeeper generally says something like, "That's how I was trained to do it" or "That's the way the last bookkeeper did it." She or he dutifully continues to perform what can amount to an arduous amount of work at the end of each month, but may never use appropriate reports to monitor the results.

P&L With Margin, Example A

	January	February	March	April	May	June	July	August	September	October	November	December
Gross Margin	30.7%	32.4%	31.5%	29.9%	33.1%	32.8%	30.9%	31.6%	31.0%	33.0%	30.0%	28.9%

P&L With Margin, Example B

	January	February	March	April	May	June	July	August	September	October	November	December
Gross Margin	21.4%	58.6%	-15.8%	38.0%	17.3%	49.0%	-2.1%	37.7%	30.2%	35.0%	71.0%	12.0%

Many companies review their P&L by running a single month, or a year-to-date, or possibly a comparison between a given period in the current year compared with a similar period in the previous year rather than running a trended P&L. This is generated by simply asking for the date range displayed by month. Users may benefit from a year-to-date P&L or (even better) a 12-month-to-date range. It's only then that the results of the WIP (or whatever else is being analyzed) can be seen easily. If your software permits you to easily display it, by all means add the achieved gross profit margin on a month-to-month basis. Without understanding the purpose of a procedure, there's no easy way to check the results to confirm that the process is achieving the intended purpose.

WIP adjustments are often derived from spreadsheet calculators that are quite complex. If your company is going through the month-end process and still getting results like Example B above, it may be time to review the purpose of WIP, examine the steps of the current process, and identify where things are going awry. If the purpose isn't being fulfilled, what's the point?

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

The Matching Principle

The matching principle is a common accounting concept that assumes a company will report expenses at the same time as the revenues they are related to. Revenues and expenses are "matched" on the income statement covering a period of time (typically, each month). Here's an example of how a company's income would be calculated when the matching principle is applied:

Matching Principle

$$\frac{\text{Actual costs}}{\text{Estimated costs}} = \text{\% complete}$$

% complete x job sale price = earned income

Example

Estimated Costs..$100,000
Actual Costs to Date....................................$25,000
Sale Price...$150,0000

To calculate % complete:

$$\frac{\$25{,}000}{\$100{,}000} = 25\%$$

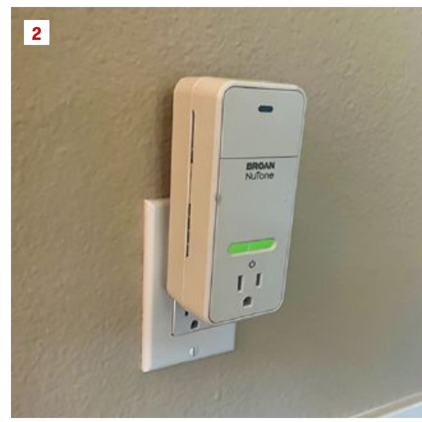
To calculate earned income:

25% x $150,000 = $37,500

Practical Ventilation Controls

by **STEVE EASLEY**

In many parts of the country, building codes now require air-sealing homes to a maximum 3 air changes per hour. At these levels, whole-house mechanical ventilation is extremely important. But when I travel around the country working with builders, it seems the mechanical ventilation systems being installed in new homes are often inadequate and often do not have any energy recovery. While indoor air quality is important, not having an energy recovery ventilator (ERV) can be a huge energy penalty for a homeowner. For example, a 2,500-square-foot, three-bedroom home following the ASHRAE 62.2-2016 ventilation table would require 105 cfm of fresh air ventilation. That means you have to reheat or recool a third of the air in a house every hour.



The Broan Overture ventilation control system uses sensors to monitor indoor pollutant levels and ramp up or turn on and off connected ventilation fans to keep pollutant levels at or below threshold levels. The author placed hardwired sensors **(1)** throughout the living areas and bedrooms. Broan also makes a plug-in sensor **(2)** that can easily be retrofit in existing outlets.

As many *JLC* readers know, there are three general approaches to whole-house ventilation: exhaust-only, which puts a tight house under negative pressure; supply-only, which puts the house under positive pressure; and balanced systems, which bring in as much fresh air as they exhaust stale air and impart no pressure imbalance on the house (neutral pressure). Of these, a balanced system is usually best because it doesn't pull outdoor air (or air from a crawlspace, garage, or attic along with unwanted pollutants) into building assemblies, as a negative-pressure system can, or push moist indoor air into the building assemblies, as with a positive-pressure system. In each case, moist air from either outdoors or indoors hitting cool surfaces in those building assemblies can condense, creating moisture, mold, and decay problems.

Even with a balanced system, however, calculating the whole-house ventilation rate using the ASHRAE 62.2 standard referenced by the code is not well understood by many builders and code officials. And when code officials don't fully understand code requirements, they tend not to inspect for them, and fewer builders are motivated to follow them. Part of what makes the standard confusing is that there are several versions with very different ventilation rates, so depending on where you build in the country and which version of the code has been adopted at the local level, the baseline ventilation rate for a continuous whole-house fan can vary.

Also, and I think this is the key point, the formulas apply to all houses and all occupants. Yes, the formula accounts for the house size and tries to account for the number of occupants, but this is indirect: The number of occupants is based on the number of bedrooms. In empty-nester homes, you could be over-ventilating and paying to recondition a lot more outside air than you need to. Or in homes with big families with more than one occupant in several bedrooms, you might be under-ventilating. Plus, occupant behaviors vary widely. In homes with lots of house plants, or firewood drying in a basement, or several teenagers taking long showers, or cooking without a range hood, there could be excessive levels of moisture and pollutants in the indoor air that are not being addressed by a ventilation system that meets code.

PHOTOS AND SCREENSHOTS BY STEVE EASLEY

The Smart Wall Control **(3)** acts as a touch-screen interface for the ventilation system. In addition to allowing users to set the mode and monitor pollution levels, it allows manual control of the fan, functioning like a standard wall switch. In bathrooms, the author included ordinary timer switches for point-source control of exhaust fans **(4)**.

Smart System

For all these reasons, I was intrigued by the Broan Overture system and installed one in a new house I completed about two years ago, so I've had a chance to see how it works. In short, I wouldn't want to control indoor ventilation any other way. I think builders and homeowners will love it because it automatically makes ventilation decisions based on a home's real indoor air quality. Once set up, it requires no interaction.

For energy recovery, I selected a Broan AI Series energy recovery ventilator (ERV). On a recent day with 110°F outside temperature, it tempered the incoming fresh air to 81°F, so it recovered most of the energy I spent to cool the home.

Typically when you set up an ERV, you have to spend a lot of time fiddling with it to balance the exhaust and supply airstreams. But this Broan unit is "self-balancing." It takes airflow measurements two times per second and automatically balances supply and exhaust airflow, making it much easier to set up as well as provide balanced air if conditions change (like a dirty filter).

However, the game-changer for me is the variety of control options the Overture system has when paired with my ERV. This system includes a number of room sensors—ones that hardwire into a two-gang electrical box or others that plug in to an existing wall outlet. The plug-in version is what you would use if you were retrofitting an existing home.

The sensors monitor indoor relative humidity, total volatile organic compounds (TVOCs), carbon dioxide (CO2), indoor temperatures, and particulate matter with a diameter of 2.5 micrometers or less (PM 2.5; a micron is 1 millionth of a meter). These tiny particles are of concern because they can move from the alveoli deep in lung tissue into the bloodstream. The sensors have LED indicators that glow green, yellow, or red to allow homeowners to understand current IAQ levels at a glance. The LED brightness is user-programmable from 100% intensity all the way down to "off." (When I compared the Overture CO_2 levels with my $175 Aranet 4 CO_2 sensor, they were within 50 ppm.)

We placed the room sensors throughout the common areas of the home, as well as in bedrooms. We located them on interior walls and not in direct sunlight (the rationale is similar to how you would locate a thermostat). The kitchen range hood can also be wired to come on automatically when someone starts cooking, and there are manual timer controls in the bathrooms for local exhaust fans. The system can be set up to run in different modes: continuously or intermittently at a baseline level to meet code, or in smart mode so it will respond to the actual conditions within the home.

In smart mode, when a room sensor detects a rise in indoor concentrations of pollutants above predetermined thresholds, the system automatically activates the ERV or other connected devices, such as bath fans or the range hood in the vicinity of the activated sensor. I set mine up to run only the ERV. You can also set the system up to run intermittently to the desired minutes per hour or continuously. It even has a turbo mode to boost ventilation levels in the event of an unscheduled cooking calamity.

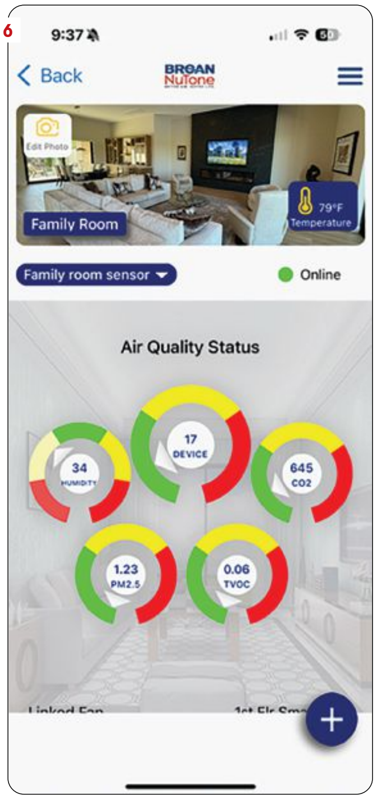
The system can also be managed through a mobile app that allows the occupants to view air-quality data in real time, track historical trends, and adjust system settings as needed. The system takes into account the outdoor air quality using the Air Quality Index (AQI; see airnow.gov) and will temporarily pause the air intake if outdoor conditions are poor, which seems to occur all too frequently during wildfire season these days.

Controlling Air Quality

A ventilation system that brings in fresh air works by diluting the concentration

5

6



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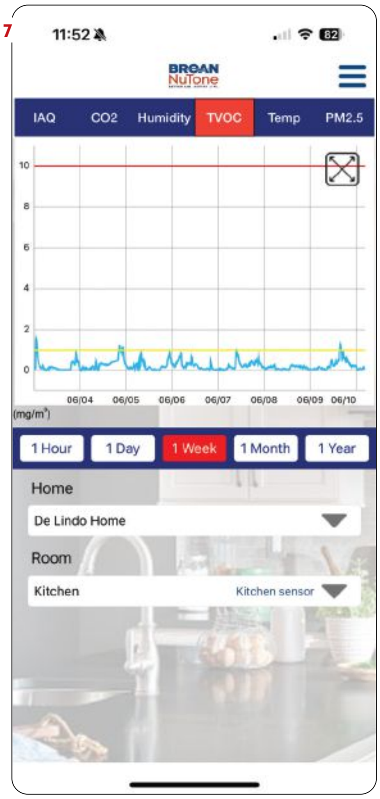

The Broan Overture system can be managed through a mobile app that allows occupants to view air-quality data in real time. The interface uses the same green, yellow, and red color scheme as the wall sensors to allow homeowners to understand current IAQ levels at a glance.

of pollutants in an enclosed space. While effective (assuming that the outdoor air is safe), it's not the only way to ensure good indoor air quality. Source control (limiting the pollutants inside the home), filtration, exhausting moisture in baths and kitchens, and pressure balancing are all effective strategies that should be prioritized before leaning on dilution as a strategy for ensuring good indoor air.

I have the ERV system set up with a MERV 13 filter, which captures 75% of particles in the 1- to 3-micron range. Broan's maximum is MERV 13. A higher MERV filter could capture a higher percentage of those particles. For example, a MERV 16 filter can capture about 95% of those particles but not without increasing static pressure in HVAC systems that can reduce airflow and put undue strain on fan motors and such. The California Energy Commission did a study to find out what happens with the highest level of filtration that you could put in an HVAC system before the static pressure started being problematic. This study showed that in terms of reducing airflow and comfort, the MERV 13 filter is at the sweet spot, capturing a high percentage of particles without imposing too much static pressure.

The codes are slowly beginning to recognize that dilution isn't the only way to control indoor air quality, too. The 2021 version of ASHRAE 62.2 now gives you credit for filtration. A great free calculator for determining ventilation rates for sizing a system is available at redcalc.com.

Perhaps as these technologies are more widely adopted, the codes will be able to let go of a generalized (and inherently inaccurate) basis for continuous ventilation rates altogether, and base ventilation requirements on the actual indoor conditions of each home. At this point in time, we don't have a lot of history with how these sensors perform over time. The manufacturer told me the designed life of the CO_2 sensor is 15 years; PM2.5 sensor, 8 years; VOC, 5 years; temperature and humidity, 10 years. We'll need that long-range data and more players in the air monitor control market. But the good news is we do have the technology now.

Steve Easley is principal of Steve Easley Associates, a building-science consulting firm based in Scottsdale, Ariz.

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Trim Details That Affect Window Performance

by **MARK PARLEE**

All exterior wood trim, especially an engineered wood, such as this LP SmartSide Trim, must be sealed on any cut edges. The trim was prefinished, but it needed to be ripped to width and cut to length, and all those cuts should have been sealed prior to installation **(1–3)**. The installer specified in his agreement that “the homeowner is responsible for painting the exposed edges of the trim” but, of course, it’s impossible to completely seal all the edges once the trim is installed.

I recently inspected a new house near Des Moines, Iowa, that had multiple siding and window problems. The builder had installed inferior windows and reportedly installed them poorly, resulting in extensive leaks. In an effort to remedy the problem, the owner bought new windows from Pella to replace the original ones and had them installed by a Pella-certified installer. It was this new installation I was inspecting, and it was also done wrong.

There were several critical mistakes, all relating to the trim. How a window gets wrapped on the exterior is not just about aesthetics; exterior trim details can have a big impact on how the window performs.

The original windows had been wrapped at the exterior with fiber-cement trim stock. For the new windows, the installer used prefinished LP SmartSide Trim. This trim had to be ripped in width to fit the space between the window frames and the existing siding, and I am reasonably sure the window contractor chose LP SmartSide, which is an engineered wood product similar to OSB, because it is easier to cut and rip than fiber cement. But the contractor failed to meet the installation requirements of either LP or Pella. These were the two most egregious mistakes:

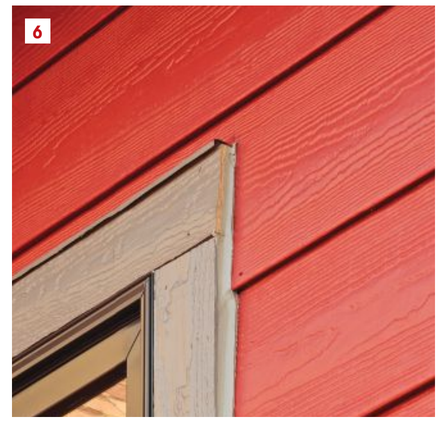
Paint and finish. LP requires all sides of all SmartSide products to be primed and painted. This is especially important at cut edges—in this case, both the ripped edges and the ends.

In conversation, the builder told me Pella advised him “the homeowner is responsible for painting the exposed edges of the trim.” However, doing that is clearly impossible once the trim is installed. It is imperative that the installer ensure all cut edges of the trim are properly sealed before it is installed. However, none of the cuts on the new trim work were sealed and, because these edges are now tight to the window or to adjacent trim pieces, there is no way to paint them without removing the trim altogether.

Gap at the window frame. Pella is specific about leaving a 3/8-inch gap between the window trim and exterior cladding, and a similar gap between the trim and the window (see illustration, facing page). Most window companies require similar gaps, though the exact size might vary by manufacturer. This gap is needed to create a proper seal using backer rod and sealant to prevent water from leaking under the trim where it might find its way under the nail fin and into the wall.

Here again, the window contractor ignored this detail and installed the unpainted edges of the trim tight to the window frame. Not only will the trim wick moisture and begin to degrade but, without the gap, there is no way to seal between the window and the trim, risking the potential for leaks.

PHOTOS BY MARK PARLEE; ILLUSTRATION BY OLA KWIATKOWSKA

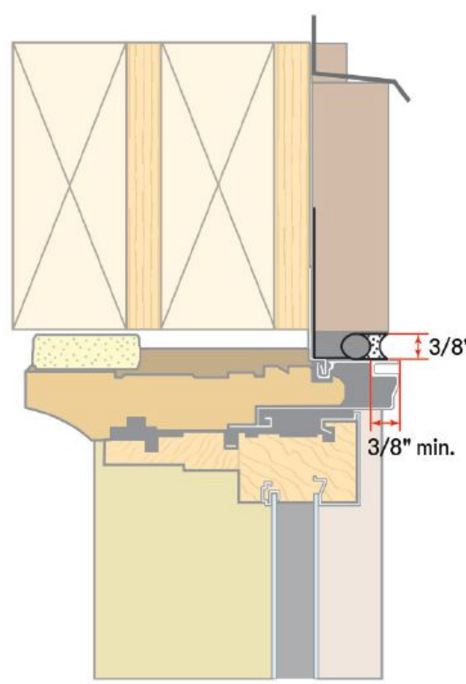


Both Pella and LP require leaving a gap on both sides of the trim—between the trim and the siding and between the trim and the window. The installer got the gap right between the trim and the siding but left no gap on the window side of the trim. This made it impossible to install the backer rod and sealant needed to prevent water leaking around the nail fin and finding its way inside the wall **(4–6)**.

In its installation instructions for SmartSide, LP also recommends a gap and sealant on each side of the window trim. However, LP specifies only a 3⁄16-inch gap, which is narrower than the window manufacturer requirements. The International Residential Code explicitly requires builders to follow the window manufacturers' instructions. The building code also tends to give precedence to the most restrictive requirements in cases where a conflict arises, and I usually recommend when in doubt to follow the more rigorous requirement. In this case, I interpret the Pella instructions as allowing for the more durable seal. Backer rod and a properly formed caulk seal are not optional in the Pella instructions, whereas the sealant details other than the minimum space are not specified in the LP instructions.

Mark Parlee is The Building Consultant based in Urbandale, Iowa.

Seal Required Between Trim and Window



In this detail adapted from the Pella installation instructions, a 3⁄8-inch gap is required between the window and the trim to allow for backer rod and sealant. This seal must be set back at least 3⁄8 inch from the face of the trim.

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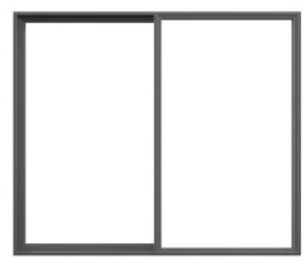

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A Custom Exterior Door

Creating a solid, maple door, jamb, and sidelights in a one-man shop

by **GARY STRIEGLER**

PHOTOS BY GARY STRIEGLER

IN THE CONSTRUCTION WORLD, WE USE the term "custom" all the time, but what does it mean? I define it as one of a kind, something made for a specific location and client. That doesn't mean it has never been done before. Most of my projects start with an inspirational picture, but from there everything is fine-tuned for conditions and location.

The entry door on a recent remodeling job is a great example. We had removed a 6/8 door with a transom and sidelights. My clients wanted a single door with sidelights, as tall as possible and with everything made of maple. The solid core maple veneer door I built was 2¼ inches thick with a simple pattern of vertical lines, and the sidelights each had three glass panels divided by simple horizontal muntins. (Note: Any glass by a door or close to a

Planing the lumber for the stiles before glue-up ensures clean and flat surfaces **(1, 2)**. The author built a sled to plane the larger glue-ups to final thickness. Shims prevent the material from rocking **(3)**. For alignment and strength, Domino XL tenons are used for the attachment of the door rails and stiles **(4, 5)**.

floor must be safety glass.) Before doing any woodwork, I ordered a threshold, door bottom, and 8-foot weather stripping from the lumberyard—the same products that would be used on a standard exterior door.

I then sorted my lumber, setting aside some straight and flat boards for door jambs, and turned to the door.

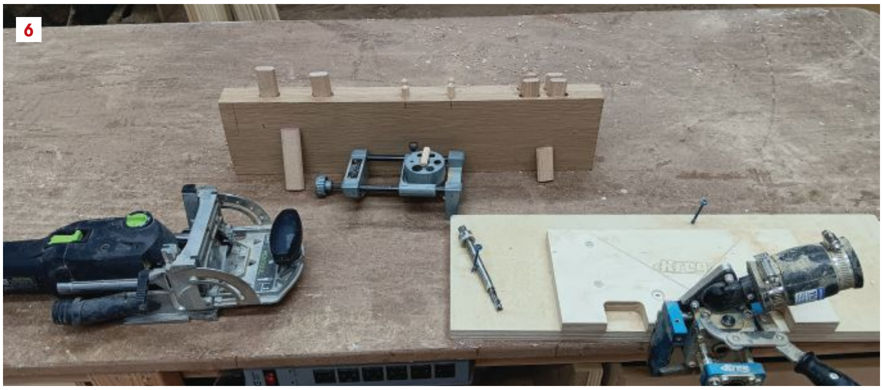
Door Glue-up

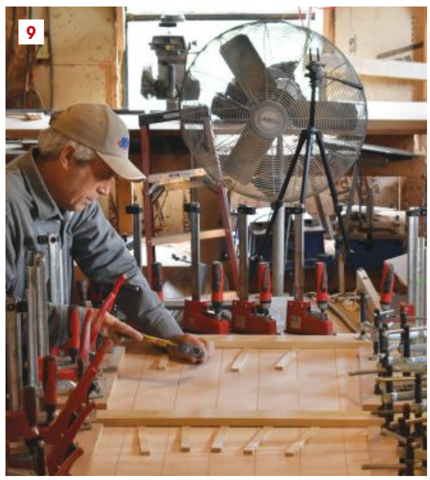
To avoid warping, I like to glue up a sandwich of ¾-inch boards, face to face, for the door-frame material. First, I rip the boards ⅜ to ½ inch thicker than the finished dimension. Before I coat the faces with Titebond glue, I make sure they're clean and smooth by using very light passes with a planer. I use pipe clamps to make a glue-up wide enough for a stile or rail **(1, 2)**. By leaving a dry joint between the stile or rail pieces, I can glue up several pieces at one time. I make the glue-up 4 or 5 inches longer than the finished length so I can trim any planer snipe off the ends. To achieve a good bond, it is critical to glue your parts up on a clean, flat surface. After a couple of hours, I unclamp the boards and scrape off most of the glue that has squeezed out.

The next step is to get a flat face on one side of the glue-up. A large jointer is the easiest way to do this, but if you don't have one, you can make a rigid sled and run the pieces through a planer **(3)**. Place shims under the glue-up to keep it from rocking. On the door shown here, the stiles, top rail, and intermediate rails were 4½ inches wide and the bottom rail, 8 inches wide.

When all the frame pieces have a flat face, I run them through the planer to final thickness. For this door, I used ¼-inch-thick maple plywood for the face veneer, so the final thickness of my frame parts was 2¼ inches minus the thickness of two pieces of plywood.

To allow room for final adjustments to fit the door to the jamb exactly, it's a good idea to build the door slightly oversized. Here I cut the stiles ¼ inch long and cut the rails an extra ⅜ inch wide. Besides the top and bottom rail, I added two intermediate rails for strength. My plan was to fill in the voids with rigid foam sheets.





These are some of the options that could be used to fit the door frame (from left to right in the photo) (6): Domino XL, dowels, and regular Domino. After touch-up sanding at the joints (7), the author spreads glue for the first skin of the door (8). With the first side glued and clamped (9), he fills the door voids with rigid foam and plywood (10).

I have a 4-by-8-foot table in my shop with a dead-level top (I used shims and an 8-foot level) that I use to assemble doors and cabinets. For the top and middle joints, I used two 12mm Dominoes; at the bottom rail, I used three. If you don't have a Domino XL, two rows of smaller Dominoes or even dowels will work **(4–6)**.

While the glued-up frame was drying, I laid out and cut the plywood veneers to size and added the vertical lines (1⁄8-inch-deep saw kerfs on 3-inch centers) using a track saw. The joints in the frame needed a little sanding, and I was ready to glue on the veneer **(7)**. I added spacer blocks to my table to make room for clamps **(8)**.

This door was well under a porch roof (if a client asks me to build a door that's not under 4 feet or more of roof, I have them respond to an email that states I do not guarantee the door), but I still used Type-2 Titebond for water resistance. I use a glue roller with a hopper to spread glue for projects like this. For a good glue joint, I use a K-body clamp every 3 inches around the frame, plus a board with wedges at the rails. If you don't have that many clamps, place your door glue-up between two sheets of MDF and put bags of cement, sand, or even concrete blocks on top to create pressure.

After an hour, I removed the clamps, fit foam and a plywood shim in the voids, and clamped the second veneer **(9, 10)**. An hour is probably enough drying time but, to be safe, I let it dry overnight, then used a hand-held planer to bevel the door edges.

Jambs

Next up are the door jambs. I run the faces of all the jamb material through a Woodmaster drum sander. Alternatively, you could make a very light pass with a benchtop planer with sharp knives.

I make the door jamb in two pieces. The first is 3⁄4 inch thick, and its width is equal to the wall thickness. For better access, I like to mortise for the hinges before I assemble the jamb. For a door this size, four 4 1⁄2-by-4 1⁄2-inch hinges work well. I make a plywood template **(11)** and use a 1⁄2-inch Whiteside template bit (part number 3000) to

The author makes a hinge template **(11)** and uses it to mark out hinge placement for the door **(12)** and jamb **(13)**. He sets the jig ⅛ inch up from the top of the door to allow for a reveal. Staples hold the jamb together better than nails **(14)**. A saw kerf will house weather stripping **(15)**.

cut out recesses for the hinges **(13)**. The ½-inch bit leaves ¼-inch round corners that must be squared out.

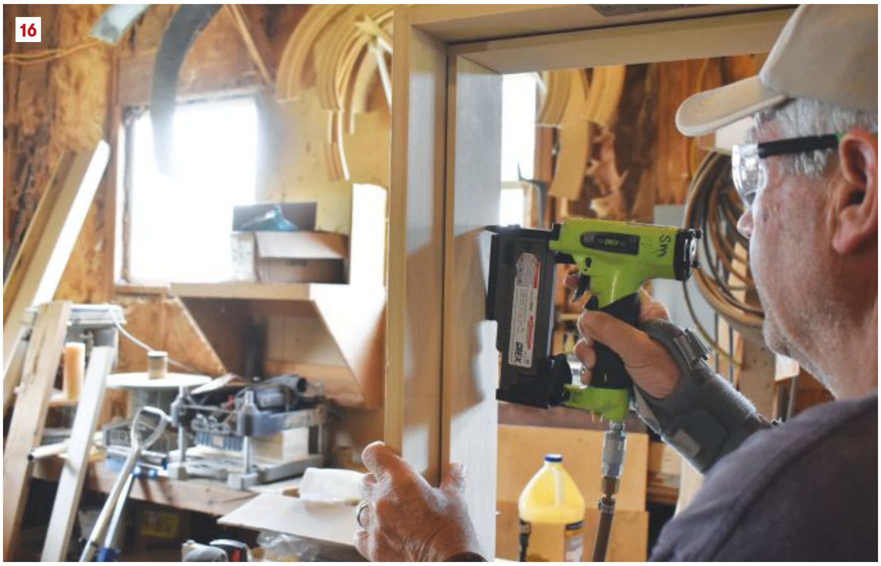
I use the same plywood template to mortise for the hinges in the door. To allow room for a reveal across the top of the door, I attach a ⅛-inch-thick spacer on the template to hook on the edge of the door **(12)**. Though this door wasn't a standard size, I started with measurements from a standard door and adjusted them to the size of my door.

The second part of the jamb is ½-inch-thick maple with a saw kerf on the back edge to seat the weather-strip fin **(15)**. To find the width of this second piece, I measured the setback on a standard door jamb and adjusted for the thicker door. To start building the jamb, I stapled the ¾-inch maple header and the threshold between the side jamb material **(14)**. I used glue and headless pins to add the ½-inch-thick maple **(16)**.

Once the jamb is assembled, I trim the door to final length and use a router with a slot-cutting bit to cut a groove in the door bottom for the weather stripping **(17)**.

Sidelights

I started to build the sidelights by gluing two pieces of ¾-inch maple together. I used this thick material to make a wood threshold with a rabbeted edge and four crosspieces with rabbeted edges for the muntins **(18)**. I stapled the head jamb and the wooden threshold between the side jambs, then added ½-inch-thick



material up to the location of the first muntin, which was also stapled in place. I added a piece of ½-inch material on each side up to the second muntin location, stapled it in place, and filled in to the top with ½-inch material. The rabbeted edges were all ½ inch to hide the spacers between the insulated glass panes. I made some ½-inch glass stop with a chamfered edge to be installed after the glass was in place **(19)**.

The last, very important step before the project left my shop was to seal the bottom of the door, thresholds, and jamb end grain with polyurethane. If you trust the painter, you can skip the door bottom, but the other areas will be out of reach by the time he gets there.

This project has held up well, with no warping or finish wearing. It fits my idea of "custom," as I took an inspiration from the client and created a door to fit their specific home. I used mostly materials I milled myself, except the hinges and metal threshold. My caution to anyone trying to scratch-build an exterior door is that it will face many different environments, sometimes all within the same day, so pick your projects carefully.

Note that if you are unable to purchase an interior door in a style your client wants, you could apply the process outlined here to make one.

Gary Striegler, a JLC *contributing editor, owns Craftsman Builders (craftsmanbuildersnwa.com), in Fayetteville, Ark.*

The kerfed piece is installed in the jamb with pins and glue (16). The grooves on the bottom of the door will house the fins of the weather stripping (17). Be sure to seal all edges before final install. The sidelights that will hold the tempered glass are stapled together and set alongside the door jamb, ready for installation (18, 19).

Managing Multiple Sidings

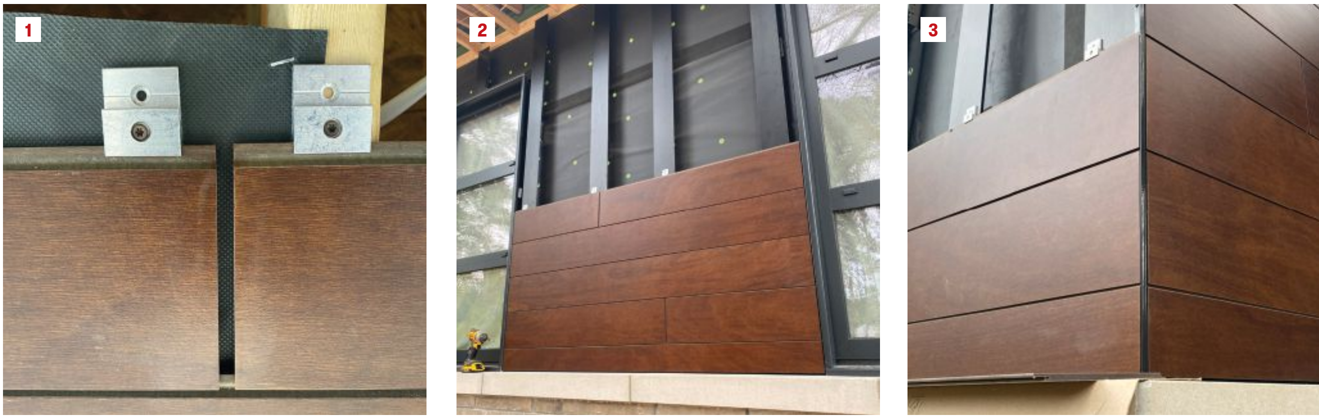
A clear order of process leads to outstanding results

by **RICK MILLS**

PHOTOS BY RICK MILLS

A RECENT, LARGE-SCALE PROJECT challenged us with several unique claddings that also needed to intersect cleanly at numerous offsets and elevations, not to mention integrate with an all-metal standing-seam roof. This project pushed us in different ways to become creative with how we managed different trades installing different products on different timelines. In some cases, we needed to jump these trades from one area of the house to another; for instance, when a particular task needed to be done before another trade could do its work or to prevent one trade from having to work over another trade's finished product.

For most subcontractors, the name of the game is getting the job done and moving on to the next project. But because of the size and overall



On a mock-up **(1)**, the author experimented with Benjamin Obdyke InvisiWrap as a "blackout" for the vertical joints between boards. Horizontal lines appear open from a distance **(2)**, but the tongues are visible when viewed close up. At corners **(3)**, the joints are closed with a small aluminum L-profile supplied by Parklex, the cladding manufacturer.

To simulate the thickness of the track-mounted Parklex siding, the siding crew screwed blocking at transition points such as inside corners **(4)** and let-in columns **(5)**. The blocking creates a pocket so the horizontal boards can slide behind the stone **(6)**. This was much easier and speedier than scribing boards.

complexity of this project, we had to explain to our trade partners that they wouldn't be able to come in and just crank through the work. There would be times when they would have to stop and wait for another trade to complete a certain aspect of its scope of work before they could continue.

As an example of the scale and technicality of installation that was required, it took almost one year from start to finish for the contractor that handled the siding and soffit cladding to complete its entire scope of work.

As this project got underway, we had already been working on mock-ups to become familiar with the materials and how to handle transitions, trim pieces, flashing, and so on. We use mock-ups on all our projects; we've found that they can be beneficial to us as construction managers, as well as to our trade partners who will be installing the materials. They can help clarify details about how materials can or need to work together to provide a clean, well-planned, finished result. (See "Practice Makes Perfect," Feb/20.)

Parklex Siding

For this build, the client was interested in an exterior material that looked like wood but didn't require the maintenance—the unicorn of exterior construction materials. We talked through several highly durable natural wood products, but they all would eventually either need maintenance or lose that rich look of freshly cut or stained wood. After some searching, the architects selected a unique and durable product made in Spain called Parklex Naturclad-W (parklexprodema.com/usa). It's created by layering a real wood veneer onto a high-pressure laminate core. During the manufacturing process, the veneer is fused to the laminate, which, according to Parklex, prevents delamination or peeling.

The Parklex siding was the dominant cladding on the house. It mounted on a metal track system that consisted of aluminum "clips" attached to the wall every 20 inches or so, with ¼-inch stainless lag screws at stud locations. These clips hold either L- (at corners) or T-shaped (in the field) aluminum extrusions that create a drainage space (or rainscreen) behind the horizontal siding boards and provide support for it. The boards attach to these extrusions with aluminum clips that have grooves to accept the tongue on the top and bottom of each board. Once in place, the boards are self-spacing, leaving a ⅛-inch gap between boards. All these elements together projected off the house 3 inches.

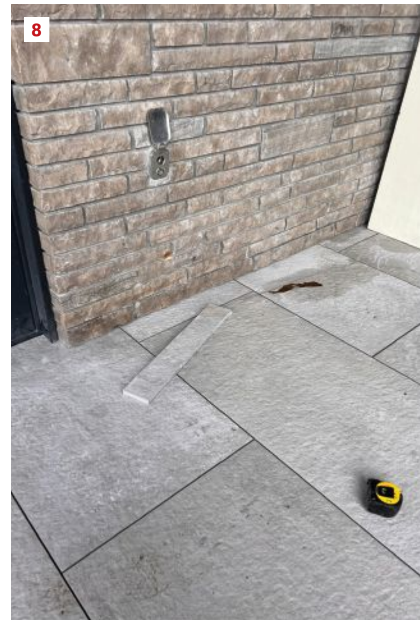
It's worth noting that this siding system can be installed over a traditional rainscreen made with 1-by wood battens. However, we opted for the larger projection created by the aluminum track system to mesh better with the already large 6-inch projection created by the stone cladding on the house. This left us with only a 3-inch change in dimension between those cladding surfaces, as opposed to the 5-inch difference we would have had if we ran the siding boards over wood battens. (Everyone agreed this was architecturally more pleasing to the eye.) The other net benefit to this system is that we were able to straighten the siding using a string line when installing the track system. This gave us more flexibility in the end.

Stonework

Though a secondary material, the stone cladding had an equally substantial presence on this house. It had been quarried in northern Canada and had a rugged but, at the same time, contemporary look, as it came in large, linear pieces. Installed like brick, the building stone required a 1-inch air gap behind it and was attached to the framing with wall ties. Anywhere the stone stopped at a certain elevation, it was capped with a 4-inch-thick, square-cut piece of Indiana limestone. The team felt like this bridged the gap from the rough-cut stone to the modern, horizontal cladding. As mentioned above, the building stone projected off the sheathing 5 inches and the limestone had an additional 1-inch overhang, creating a 3-inch offset from the face of the siding.

After working through a few different window options with the client and architect, we decided to use a European window from Schuco sourced through European Architectural Supply (EAS) out of Boston. We knew we needed some type of exterior "casing" that could integrate with the 3-inch projection of the siding. After talking with EAS, it informed us that Schuco could create an aluminum extrusion to case the windows. We mocked this up for the clients to see (along with the siding and stone), and they gave us the go-ahead to move forward with this detail.


7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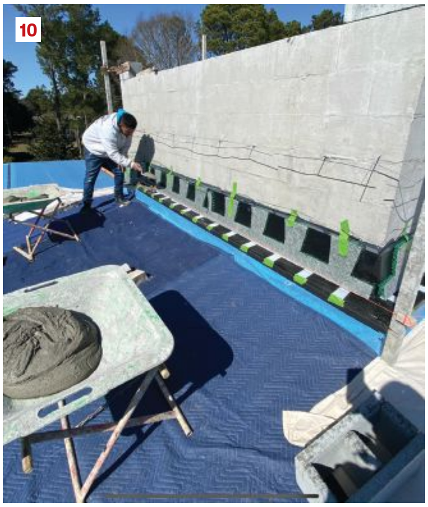
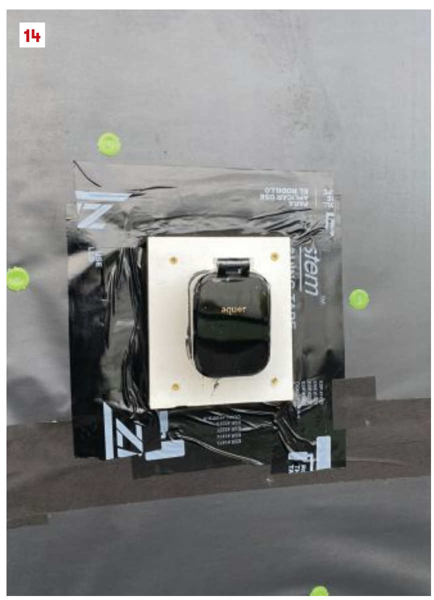
To create a clean joint between tile pavers and stone cladding, the author had concrete block set at the tile elevation as a temporary filler to allow the pavers to slide in beneath the stonework.


9

For this vertical transition, the crew had to install the Parklex first, running it long so it would extend behind the stone.



Prior to the installation of the metal roofing and before installing the stone, the masons installed through-flashing and MortarNet on a curb that supports the stonework for a chimney **(10)**. This work was extremely messy **(11)**, so it was much more efficient to do it before the metal roofing was installed **(12)**.



The siding crew used solid PVC blocking sealed with Zip tape for the Aquor hose bibs—shown here without the cover **(13)** and with the cover **(14)**. The blocking varied in thickness, depending on the type of cladding.

Order of Process

Once we moved through the mock-up process, it was easy to determine which trades should do their installations first and which trades should delay the start of their portion of the project. We call this "order of process."

Because the building stone would wrap the circumference of the building, the stone masons would be the first trade on site. Once underway, they had a few months to install some larger sections before we released the siding crew (the same carpentry team that framed the house and handled all our block-out work; they were involved in approving the original mock-ups, so they were already in tune with the project).

Having a crew that was already familiar with the project was extremely helpful. As the masons were progressing, we were able to foresee which areas would need some "prep" for the stone to cleanly install the siding and the soffits. Sometimes, this prep work was as simple popping a chalk line where there would be a transition. In this way, the siding team acted as a check for the masons, helping to verify that what was on the plans was accurately transferred to the house. In a lot of places, this prep work included installing what we called "simulators"—blocking or continuous 2-by material that mimicked the 3-inch siding projection and created a pocket in the stonework that would allow the siding crew to run their siding behind the stone at intersections. This detail meant they could forego scribing boards to the stone surface.

What we found worked well for these simulators was to screw two 2-bys to the house; one 2x6 attached to the house with screws toward an edge where they wouldn't be covered by stone, followed by a 2x4 that got covered by stone. This made for easy removal and reuse.

Similarly, we used CMU block set at the elevation of the finished tile as a temporary fill beneath the stonework surrounding the deck. This allowed the tile pavers to slide in beneath the stonework later in the project.

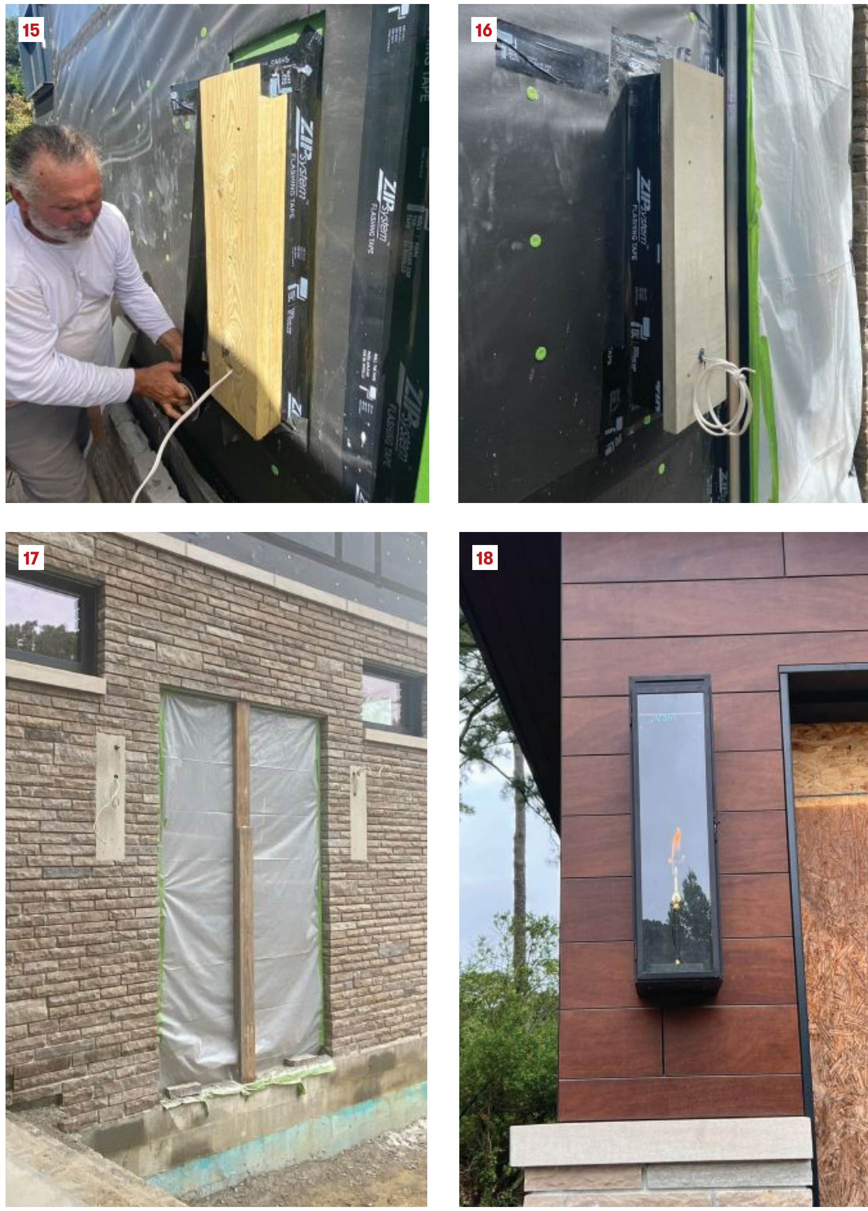
Our thought behind our order of process was two-fold: First, on a house of this scale, there should be no need to have two trades working in the same area at the same time.

Second, and of great importance for keeping the project on schedule and on budget, we tried whenever possible to arrange the work schedule so we wouldn't have to spend a lot of extra time protecting installed materials. Since we knew up front that stonework would be extremely messy (lots of mortar droppings are always expected), we opted whenever possible to install that first. There were, of course, some things, such as the windows, that would still need to be protected.

We worked hard to avoid installing stone up against finished Parklex and over metal roofing. There is no simple repair process for metal roofing, especially. If a panel gets damaged, it typically needs to be replaced, which means removing all the panels in front of that panel (think of a tongue-and-groove style installation process). Damage to metal roofing can be inflicted by just about any trade working over or around it, including painters setting up ladders, electricians installing flood lights, and so forth.

Installation Details

After the stone crew had gotten about halfway around the house, we had the siding guys get started with the siding installation. Even though we had done some mock-ups, it was a bit of a slow start. Tackling larger walls, ensuring the siding was running cleanly around the window trim (the clients requested window casings flush with the siding), and ironing out the details for finishing outside corners all needed to be refined. After the crew had the first few walls under their belts, they were off and running and tying into areas that they had previously prepped for the masons. Once we saw the results of pre-planning coming together, everyone was floored by the ultra-clean transitions at elevations, corners, and ceilings.



For the gas lanterns, the crew used a combination of pressure treated (PT) lumber **(15)** and TruExterior 2x10 **(16).** Thicker PT was required for the mounting blocks that finished flush to the stone **(17)** than for the blocks that finished flush to the Parklex siding **(18).**

This house had many different offsets and elevations, which created lots of unique situations. For example, on the front of the house, we had one "flat transition" from siding to stone occurring in the plane of the wall. In most of the previous locations, the transition from stone to Parklex happened at an inside corner. In this spot, however, the stone skirt stepped up in height in a flat wall area, and the track system would have prevented the horizontal boards from slipping into

The clean transition lines and variety of cladding textures and colors create a well-composed exterior that perfectly met the clients' and architect's expectations.

a pocket created by our double-2-by simulators. After some discussions with both crews, we came up with a plan of running the siding first, a little long so it went behind the stone, and having the stone crew notch their last piece (essentially a vertical corner because the stone is thicker than the siding). Once complete, the stone and siding blended seamlessly together.

While it's often possible to hold off on the roofing installation, we also had to make sure that we had installed preflashing (such as at roof-wall intersections where one leg of the flashing had to be installed under the siding). If the roofing contractor is already on site working in other areas, the roofers will most likely be tracking this and can pop over to install the preflashing. Sometimes, however, we needed to request the roofers to come out for the preflashing install.

On this job, two large chimneys came up through the metal roof, so we made sure to get the masons in early and out of the way before the metal panels started to go in. For this to happen, we had some "curbs" built to support the stone, which in turn did need that preflash metal installed first. This would have been a huge mess if we had forgotten to have the roofers out before the masons. I've found that the best way to avoid missing details is to keep all your trades informed about what is happening and confirm that the planned order of process makes sense to them.

Another area that's critically important to dial in is the cladding finish details around exterior lights, receptacle boxes, hose bibs, bath fans, and the like. Knowing the specific products used on the exterior and planning for these before installing the finished surfaces can save a lot of headaches. I've seen many projects over the years where the client didn't know what light fixture they wanted to install, and we couldn't plan an intentional detail for how it would be mounted. Also, making sure the trades have completed the rough-in portion of all the exterior penetrations seems like an obvious one, but it can slip through the cracks when scheduling delays occur. On this project, we did have all those details ironed out with the clients ahead of time. Included were some cool gas lanterns, which were new for us, but we had plenty of time to devise built-up mounting blocks for these, as shown in the photos on page 45.

I like figuring these decisions out; it's like putting together a puzzle and determining which pieces fit best and in which order. Some items on a job are obvious and always go in a certain order, but others require meticulous planning and coordination of all the trades involved.

Control the Process

It's important to not let trade partners run the project or dictate how they want things to happen. As the project manager, I can see the entire scope of the project and create a schedule for the order of trades that makes the most sense given all the factors at hand. Learning the reasons that go into all the decisions that need to be made over the course of the entire project takes time and experience and is largely based on working with different materials over numerous projects.

It's also important, however, to talk to the trades and ask them what their preferences are. My favorite question to ask trade partners is "what do you find on other projects?" This could be things they like or things they don't like that they would prefer the GC to do differently. I've found this can be one of the biggest ways to learn how to keep trade partners happy. We can't always accommodate all their preferences, but making an effort to help them out where you can and listening to their concerns can go a long way toward creating a successful finished product.

Rick Mills is a senior project manager for Jackson Andrews Building + Design, in Virginia Beach, Va.

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Products

by **VINCENT SALANDRO**

1. Black Vinyl Windows and Doors

Cornerstone Building Brands has introduced black interior and exterior options for Ply Gem 1500 Vinyl Collection windows and patio doors. The black color is integrated into the vinyl via a coextrusion process that also incorporates UV inhibitors and reflective pigments to mitigate the heat absorption and material stress typically associated with darker colors. The windows and doors are available with traditional and contemporary frame styles, multiple grille designs (between the glass and simulated divided lights), Energy Star certification, and glass packages from Low-E to HPMax triple pane. ***plygem.com***

2. Brick Façade Mounting Trays

Durus Standard brick-façade trays feature teeth that can secure bricks from a variety of manufacturers, including Belden, Endicott, and Metro. Weepholes in the 20-gauge 304B stainless steel trays allow moisture to drain out, and a 2-inch air space between the trays and the house wall allows for bulk drainage and airflow to help the wall assembly dry. Stiffener ribs and a uniform base add structural strength and guide horizontal and vertical alignment. Spacing between trays can be adjusted to account for rough openings. ***desanapartners.com***

3. Stained Wood Siding Finishes

LP Building Solutions Natural Collection is a line of nature-inspired colors within the LP SmartSide ExpertFinish Trim & Siding portfolio. In the collection are six prefinished colors that capture the look of stained wood, available in cedar and brushed smooth finishes. The color palette—the first introduced since the product line launched in 2020—meets the demand for wood-inspired tones without compromising on durability or ease of installation, according to LP. ***lpcorp.com***

4. Durable Porcelain Pavers

Belgard says that its November porcelain paver line is inspired by nature, combining characteristics of stone and cement. The durable, low-maintenance paver line comes in a 24-by-24-inch size for cost savings and faster installation time. According to the company, November pavers resist staining, scratching, and slipping and will retain visual appeal as they weather. ***belgard.com***

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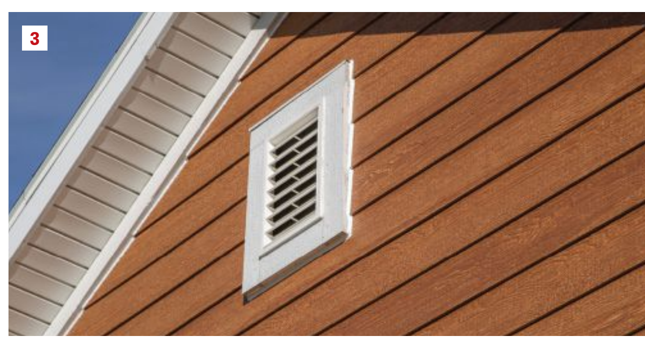
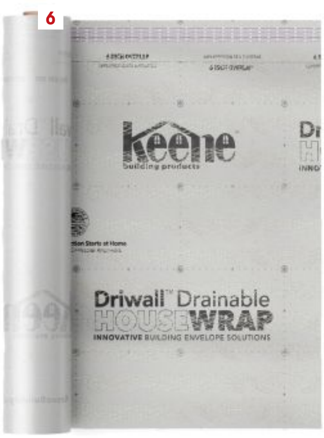




5. Rebar Connection Clips

Crafted from heat-treated metal and finished with mineral oil to help prevent corrosion, the Badger Grip Clip is designed to simplify and strengthen rebar cage assembly. The clip has a simple clamp-and-release mechanism operable by one person. The company claims using these clips will reduce labor time, error, fatigue, and material costs compared with traditional tying methods, and ensure precision in reinforcement placement. A bucket of 100 clips costs $72 online. ***badgerrebarproducts.com***

6. Drainable WRB

Driwall Drainable Housewrap combines the benefits of a high-performance weather barrier with a 1.5-millimeter continuous drainage plane to prevent moisture buildup behind cladding materials. The manufacturer says the material provides multidirectional drainage while allowing vapor to escape. Integrated seam tape speeds installation. The housewrap is partially transparent, enabling installers to see chalk-lined studs for precise alignment. ***keenebuilding.com***

7. Drive System Enhanced Fasteners

FastenMaster's HeadLok Structural Wood Screws now feature the Torx ttap Drive System. The company says that Torx ttap combines the ease of Torx drive with a ttap stability button and that the design provides superior bit engagement for a stable, wobble-free installation while preventing strip-out during installation. HeadLok fasteners have a large, flathead design with chamfer for increased strength, a sharp point for faster installation, and a 3⁄16-inch-diameter shank that offers higher design shear than 3⁄8-inch lag screws. A bucket of 250 10-inch screws costs about $285 online. ***fastenmaster.com***

8. Thin Profile Surfaces

Wilsonart has introduced 16 new surface designs to its Thinscape Composite Tops collection. The European-inspired, ½-inch-thick profiles provide resistance to impact, scratches, and moisture, according to the company. Wilsonart also says the stain-resistant surfaces don't require sealing and are available with color-coordinated cores. Select from stone-, wood-, and textile-inspired designs as well as solid colors. Thinscape is Declare label, HPD, and UL Greenguard Gold certified. ***wilsonart.com***

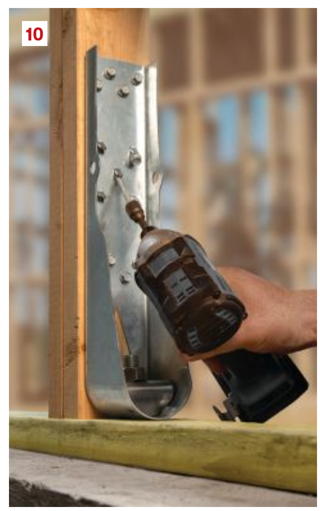
9. Iron Hardware Carriage Doors

American Tradition garage doors from Haas Door combine the elegance of original handcrafted wooden carriage doors with the detail of wrought iron hardware. The series' 9200 models are $2\frac{5}{8}$ inches thick with a full thermal break, a 0.081 tested U-factor (about R-13), and an air-infiltration seal; 9600 models are 2 inches thick with a full thermal break and a 0.096 tested U-factor. American Tradition doors are fabricated with 26-gauge galvanized steel and polyurethane overlay boards and are available with wind load and impact options. ***haasdoor.com***


9

10. Re-engineeered Holdowns

Simpson Strong-Tie's HDUE replaces its HDU for shearwalls, braced wall panels, and other lateral-force-resisting applications. According to Simpson, angled fastening in the four larger sizes engages the screws in tension for higher load capacity, reducing the number of screws required. In addition, the teardrop-shaped holes permit selected fasteners to engage and distribute the load more evenly; a predeflected seat reduces deflection under load; and an overlapping back plate increases steel strength and helps prevent post splitting. ***strongtie.com***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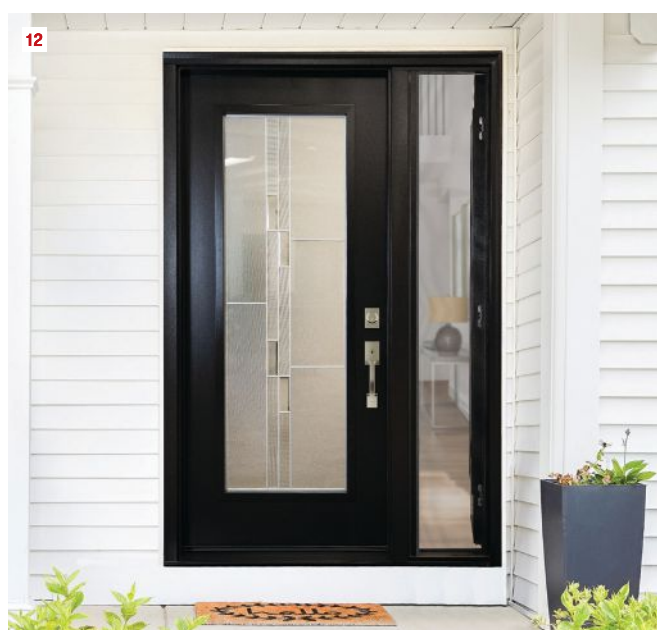
11. Jobsite Security Camera

The Ulticam Dot portable, wireless, weather-resistant security camera combines advanced features with a subscription-free model. Priced at $70, the compact, battery-powered camera can deliver QHD video, night vision, an ultra-wide field of view, and motion detection powered by edge AI. Suitable for jobsite security, the camera mounts on a magnetic base, peel-and-stick adhesive, or screws. ***ulticam.com***


11

12. Enhanced Fiberglass Entry Doors

ProVia introduced a venting sidelight and removable mull post for its Signet fiberglass entry doors with FrameSaver frames. The venting sidelight opens with a quarter turn of a knob, revealing a built-in retractable screen. A magnetic rail secures the screen in place, allowing fresh air to enter the home while keeping insects out. The venting feature is available exclusively on ProVia's strike-side sidelight and can be ordered with or without a removable mull post that enables homeowners to temporarily create a larger door opening. ***provia.com***


12

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 Maktrak Modular Storage

by **JAMES BURGESS**

For several months, I have been using Makita's new modular packout system, the Maktrak. I've brought the full seven-box configuration with me to many jobsites with various working conditions, which has been a great way to test its durability, versatility, and mobility **(1)**.

The first challenge for the Maktrak was that my small, older-model Tacoma pickup truck has no tonneau or cap on the bed. That meant that whenever the containers were in the truck, they were exposed to the elements. But rain, sleet, snow, you name it, the Maktrak had me covered. No moisture ever leaked inside. The lid of each container is double lipped with a rubber gasket all the way around, forming a waterproof seal when it is latched. This seal protects against dust and debris, too, when the containers are near a working area on the jobsite or in the shop.

Another feature of the design is that cables connect the lid and base of the large boxes **(2)**. Even with the bins above full of tools, they prevent the boxes from flipping over. The cables are removable if you ever want to fully remove the lid. The bins all can be locked into each other from the left or right; however, the release lever to disconnect them is on only one side of each unit.

In custom homes, you never know what challenges you'll be facing when you are doing the finish carpentry, so sometimes you need to improvise. To that end, the Maktrak is the perfect height to double as a worktable or a stand for a piece of machinery, like a thickness planer or router table. I would be interested to see if, one day, Makita releases mounting plates for further customizing the packout with, for example, a small table saw or miter saw.

Labels on the lids clearly warn against using the containers as a step and, while I never used them as that way, they were definitely sturdy enough to accommodate a planer and router table. The lids are a thick, molded plastic and, so far, none have cracked or warped, or appear scratched.

The system lends itself well to customization. Each bin comes with removable trays and dividers, allowing everything to fit snugly. On the rolling tool chest, the large toolbox, and the extra-large extension toolbox, the inside of the lid has slots for Velcro to loop through for organizing the contents even further. When I first received the Maktrak, I transferred every tool in my previous system (from a different manufacturer) to it, plus other tools that were floating around, and I still had room to add more—and I keep finding ways to add even more.

As you load the bins up with tools, you obviously pack on the weight. However, that never seems to be a problem. The design transfers all the weight from the handle down to the wheels so you can easily maneuver the rolling tool chest even with all the other bins stacked on top. The large 9-inch wheels make it easy to pull the whole unit up or down stairs and over extension cords or other debris common on a construction site. Note that the wheels are plastic, so they're not great for finished floors, or even floors with only light protection.

Makita Maktrak storage modules come in seven styles **(1, 2)**. The large bins have hinges on two sides for better access and a removable safety wire to prevent tipping. Using the handle on the rolling tool chest, the author levers the fully loaded stack into the truck as a unit **(3)**.

PHOTOS 1–3: JAMES BURGESS

The added weight can complicate loading it as a unit in and out of the truck. To help with that, the Maktrak's rolling tool chest handlebar has rubber gecko grip stoppers that are meant to hook onto the end of a tailgate and provide a pivot point when you grab the tool chest from the back end, lift it up, and slide it into the bed. This design reduces the lift strain and makes sliding in all seven boxes, even fully loaded, a breeze **(3)**.

Not every construction site is graced with stairs, or easy access, in which case you may need to break the Maktrak down. All the containers have convenient grip points and large handles, making them easy to carry even while you're wearing gloves.

A concern on the jobsite is security. All the bins that open in two directions have four lockable points, while the containers that open in only one direction have two lockable points. They also have a slot inside meant to store an air tag or similar tracking device so you can keep an eye on your tools.

Overall, the Maktrak is robust and well-designed. While late to the market, Makita has reimagined its storage system with a lot of customization potential. It has already proven itself on the jobsite for me. The cost for all seven pieces shown is $850 at makitatools.com.

James Burgess is a carpenter and cabinetmaker in Ottawa. Follow him at @jbcwoodwork.

PHOTO OF HOOD LIGHT, FAR RIGHT: MARC FORGET

DeWalt Hood Light

by **MARC FORGET**

Lighting is usually a challenge on jobsites. Task lighting can pose even more of a problem, as most available lighting solutions cast light around the space and not down onto your tools. Ideally, I want a light that I can set above a miter saw to cast downward, and I want it to be cordless so it doesn't use scarce outlet space.

The DeWalt hood light is designed to hook on a car's hood and illuminate the engine bay. However, the padded hooks and telescoping arms (51-to-74-inch expansion) that allow it to attach to the underside of a hood also adapt easily to a jobsite. The spring-tensioned arms can grab joists and stud walls and run from one empty pot light rough-in to another without causing damage to the surface. I can now get 1,700 lumens of light directly above my workstation with no dangling cords. A single 5-amp battery lasts about seven hours of continuous light, after which the unit will flash to indicate a low battery. The light folds to a compact 26½ inches and weighs just shy of 7 pounds. It has high and low light settings as well as the option of having only one side lit at a time. While the jobsite is not its intended application, it has proved effective in providing much needed task lighting on site.

The DCL045 Hood Light (bare tool) costs $170. dewalt.com

DeWalt's hood light provides cord-free task lighting where you need it for almost a full workday on one charge (above).

Levrack Mobile Workstation

by **JAKE LEWANDOWSKI**

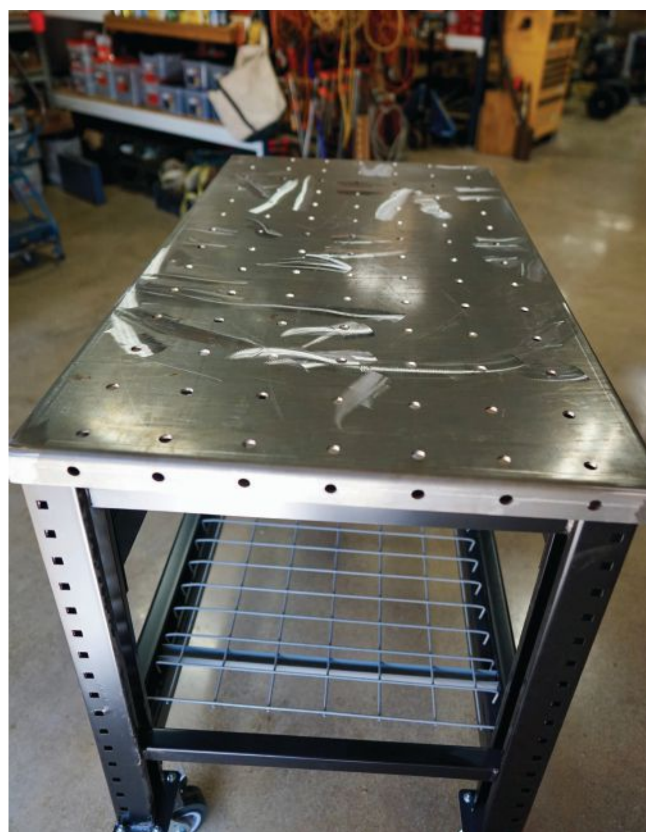
Levrack is a company based in Nebraska with the sole goal of keeping you organized. Everything it makes is heavy-duty and professional grade. Recently, it expanded its lineup to include a few versions of what it calls a "workstation," or what I know as a "fixture table." Think of a robust workbench that works like a Festool MFT/table but is made of steel. It has a milled-flat, 3⁄16-inch A36 steel top, with 5⁄8-inch holes spaced every 4 inches. Though it's called a 4-foot workstation, the overall dimensions differed from the website specifications. I recommend reaching out to Levrack if you need exact sizing (custom sizing is also available). It's rated to 2,000 pounds; I haven't put anywhere near that much weight on it, but it has supported several 100-pound rolls of aluminum effortlessly thanks to the large, heavy-duty, lockable casters that come standard with the table.

I had originally thought that it would be a dedicated fabrication table for us, and it has excelled at that. Surprisingly, though, I've used it more frequently for performing small-engine maintenance and repairing tools and equipment. It's great to be able to securely clamp what you're working on straight to the table, exactly where you want it, especially a smaller item that requires a large breaker bar.

It's hard to find anything that I dislike about this table. I do have two issues that are more an opinion or concern than a dislike. For one, it feels too tall. Tuning up a power trowel or a generator on it can be awkward. Even fabricating rebar cages has me considering grabbing a step stool. I hope to find a more permanent home for it at the shop and will probably either remove the casters or put the table to use and fabricate a mount to outboard the casters, similar to what you would find on a cabinet saw. My second concern is about the top thickness. The 3⁄16-inch top has held up great for the few months I've owned it; still, most fab tables are substantially thicker—along with, of course, being substantially more expensive.

All in all, it's a great all-around workstation that could bring value to most professional contractors. The Levrack workstation shown here retails at $1,550 from levrack.com.

Jake Lewandowski is a construction manager with Chicago-based Great Lakes Builders.



PHOTOS: JAKE LEWANDOWSKI

The Levrack 4-foot (actual length is 55 inches) workstation has a robust work surface with holes for mounting tools as well as a storage shelf underneath. The table pictured is 30 inches wide; it can be ordered with a solid or perforated top by special request.





On Sawdust

by **DAN HOLBROOK**

Sawdust. It's everywhere carpenters are. Even a short stint in a shop or on the job confronts you with the long-standing issue that it accumulates rapidly and in large quantities. Collecting it or moving it out of the way, however, merely postpones the ultimate question: what to do with all that waste?

The same question emerged on a larger scale in the history of the wood industry. In the 19th century, that industry disposed of waste as many others did: Companies piled it up or dumped it somewhere else. But as the wood industry grew, the magnitude of the problem became daunting. Reliable calculations throughout the 20th century suggest that 40% of a log by weight is wasted in the conversion to lumber. On average, every thousand board feet of lumber sawn produced one ton of waste, much of that bark and chips, but almost half sawdust and other fine residues. What to do with it? Early mills built on rivers and streams simply poured it into the water downstream, hoping the current would whisk it away. With increased tonnage, though, wood waste accreted along shores and behind obstacles, creating massive blockages and damaging fish populations. Lawsuits followed, pitting fishermen against sawmills.

Steam-powered mills eased the trouble a bit; some waste could be burned to produce steam to run the engines. But the volume of waste far exceeded that demand, resulting in huge sawdust piles. In fact, the American spirit of competition created rivalries around who had the biggest one. *Ripley's Believe It Or Not* named Red River power plant's waste pile in Westwood, Calif., as the world's largest, but it was supplanted by a 130-foot-tall mound in Portland, Ore. Not to be outdone, Cheboygan, Wis., claimed its heap was the largest, covering some 12 acres and hyped at 150 feet high, though photographs and memories put the height at a more realistic 50 feet. These piles weren't without hazards; spontaneous combustion or collapse and burial endangered anyone nearby. Anything not piled was burned in enormous "beehive burners" that roared day and night, spewing sparks and smoke. Even the growth of electric utilities burning wood waste to generate power couldn't consume the massive volume.

The situation was untenable; the lawsuits, danger, and cost of the waste burdened businesses. In the early 20th century, an industrial culture of efficiency emerged, exemplified by the Swift meatpacking company's success profiting from "every part of the pig but the squeal," and engineering societies sponsored a broad research program concerning waste. The resulting 1921 publication, *Waste in Industry*, surveyed the causes of and cures for waste in several trades, including building. Sawmills and industries of all sorts started to examine their waste. In 1922, *The American Lumberman* journal held that "the turning of waste in forest products into something worthwhile, something profitable, is of the greatest interest." A 1927 issue of *The Timberman* magazine argued that "A factory having no regard for waste and no regard for economy in cutting up its lumber is lost, for ... this waste if conserved would itself produce a reasonable profit. We must either utilize our waste or figure it as part of our cost."

New uses for wood waste emerged: Finely ground sawdust—wood flour—went into linoleum, dynamite, briquettes, and fuel pellets; "hogged" waste fed pulp mills to produce newsprint and corrugated cardboard boxes; compressed sawdust was used for particleboard, animal bedding, and mulch. By the 21st century, of the 150 million or so tons of wood waste produced annually in the United States, 98% was used rather than wasted.

The timber and lumber industry success in dealing with its waste problem has given me a new perspective on my own world-record sawdust pile, though, sadly, I have not had quite the same success in reducing mine.

Dan Holbrook is professor emeritus of history at Marshall University in Huntington, W.V.

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