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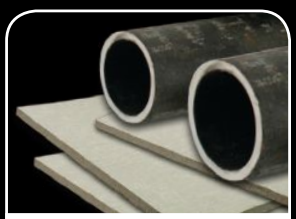

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Contents

January 2013 • Vol. 31 • No. 4

Features

ON THE COVER: Robert Reap and Matt Dyer of Reap Construction install an LVL beam on a site in South Burlington, Vt. See the story on page 33. Photo by Andrew Wormer.

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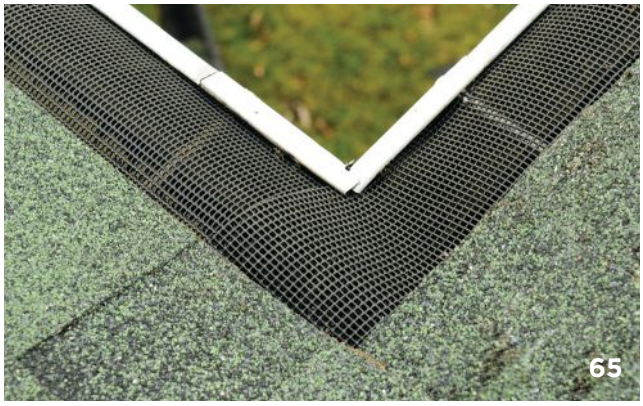

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From the JLC Forums

Lifting a 600-Pound Beam

Veteran contributors to *JLC's* Rough Framing Expert Forum advise a new member about his plans to lift a heavy beam into place .

We need to lift a glulam beam. It will rest 20 feet above the floor and will be 26 feet long. It's 5 1/2" wide and 17" tall. Estimated weight is 600 pounds. My son and I have lifted 400-pound beams into place before using block-and-tackle and I think we can do it again. We'll have six people on this job.

I would build a frame about 3 feet above the final resting point to hang the block-and-tackle from. Should be fun. — *DonBondo, Northwest Arkansas*

I bought a duct lift, the hand-crank kind. It's one of those things I never thought I needed, now I use it damned near every week. — *Bullhart, Belmont, Ohio*

This is one situation where I prefer multiple-ply LVLs. It's easier to lift three individual 1 3/4"x18" beams than one single 5 1/2"x18". Especially when it's 20 feet up and 26 feet long. — *Kpatrix, Houston*

I rent a boom truck for about 20 minutes to put up sticks like that. No way I even want to touch a 600-pound beam. There are three guys here with booms and they are quite affordable — it costs $75–$100 for the average drop-by-and-set-a-ridge-beam deal, and two of us can do it. Setting up scaffolding and all of that costs more (at least for me), and with a hoist you still have to muscle the thing onto its posts and risk being under it. I know I sound lazy, but I'd rather sip on my latte while the operator throws straps on the thing and picks it. — *David Meiland, San Juan Island, Wash.*

I vote for the boom truck also. Seriously bad things can happen, real fast. I've set many, many large beams with muscle, lifts, cranes, and boom trucks, and I've seen two come down really hard. Both times it was literally inches from "lights out" for somebody. Permanently. — *Tom, San Diego*

Depending on who's around, I've also used an excavator. The bigger ones have astounding reach. A good operator with someone competent on the spring line could have that set in just a few minutes. — *Lavrans, Seattle*

Another crane or boom truck vote. Depending on what kind of job you're doing, get some use out of the crane while it's there — like moving a pile of plywood. — *FramerT, Richmond, Va.*

I agree with kpatrix, use LVLs. It's a lot easier to get one ply at a time up there.

Or rent some Vermettes. They are beam lifts that I borrow from a local union outfit for lifting beams. I have to buy their ironworkers a case of suds to get them out of the parking lot. — *Stretch, Battle Creek, Mich.*

Before I got my material handler, used to use wall jacks. Use pump-jack arms to hold the top in place. — *Allen Colburn, Pascoag, R.I.*

I just finished a project with *two* triple-ply 16" LVLs 24 feet long set 3 feet off-center of the ridge to hold up the roof. It's amazing how large a beam is sometimes called for. We used a truck crane to set them in place before we framed the roof. Total cost $100. Can't beat it. — *BigLou80, Western Massachusetts*

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Making Sense of Spray Foam and Ignition Barriers

A recent press release from the Icynene Corp. announced the company's rollout of a new open-cell spray foam, Icynene Classic Max (also identified as LD-C 50, Version 2), which has been tested and approved by the ICC-ES for residential use without an added ignition barrier. At least two open-cell foams on the market have already earned approval for the same use, with another expected late this winter (see sidebar, page 17). As this product category continues to grow, it's worth considering what ignition barriers are designed to do, and how the new nonbarrier foams fit into that picture.

Thermal barriers vs. ignition barriers. All polyurethane spray foams require a code-approved thermal barrier — ordinarily a layer of ½-inch drywall — between the foam and any adjacent living space. The thermal barrier is designed to make it harder for a fire inside the living space to gain access to the fresh source of fuel in the spray foam, giving the home's occupants more time to escape.

Ignition barriers, by contrast, offer a lower order of protection, and are intended simply to prevent a possible flame source from making direct contact with the foam. They are required in foam-insulated attics, crawlspaces, and other areas with limited access that can't be used as living space. The IRC lists six prescriptive ignition-barrier materials: 1½-inch mineral fiber insulation, ¼-inch wood structural panels (such as plywood), ⅜-inch particleboard, ¼-inch hardboard, ⅜-inch gypsum board, and corrosion-resistant steel with a base-metal thickness of 0.016 inch or more. Apply any of these materials over the foam in areas where an ignition barrier is required, and you've met code.

The problem is that these sorts of barrier materials take time and effort to apply — especially when you're lying on your side in a cramped crawlspace or sealed attic. Fitting full-size pieces of sheet material into such spaces is often difficult or impossible.

Intumescent coatings and bare foam. Fortunately, prescriptive ignition barriers aren't the only route to compliance. Spray foam can be

Spray foam adjacent to living space must be covered with an approved thermal barrier, but new open-cell foams give builders other options in sealed attics and crawlspaces.

■ Cash-strapped consumers who once would have bought homes are increasing looking to the single-family rental market instead, and Wall Street is doing its part to help. According to *The Wall Street Journal,* private equity companies nationwide are buying up foreclosed homes with an eye toward rehabbing them and converting them into rental properties — a trend the paper described as "the next big thing on Wall Street." One company profiled in the story currently owns about 3,600 properties, and expects to increase its inventory to 10,000 within the next six months.

■ It's not exactly Hurricane Sandy, but homeowners in western Washington state are beginning to cast a wary eye on beaver dams. Late last fall, a burst beaver dam in the community of Duvall washed out two roads and damaged one home. According to the *Seattle Times,* a larger beaver-dam failure in 2009 unleashed a 10-foot wall of water in the town of Clinton that destroyed eight homes. A spokesman for the state's Department of Fish and Wildlife told the *Times* that "massive failure of a beaver dam is not a common experience."

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Non-Barrier Spray Foams

The following open-cell spray foams have been approved by the ICC-ES for use in crawlspaces and sealed attics without an intumescent coating or prescriptive ignition barrier:

Icynene LD-C 50, Version 2, Icynene (icynene.com)
ESR-3375, SES Foam (sesfoam.com)
Gaco FireStop 5500, Gaco Western (gacowallfoam.com)

In addition, foam maker Demilec USA has announced plans to introduce its own ignition-barrier-free open cell foam, Demilec ACX, in mid-February.

protected with an intumescent coating, which is applied like paint and bubbles up when exposed to heat, forming a flame-resistant barrier layer. Unlike prescriptive ignition barriers, such coatings must earn code approval on a case-by-case basis by passing a burn test administered by the ICC-ES. (That test, ACC 377, appendix X, is also known as the modified NFPA 286 test.) Virtually all spray-foam manufacturers now offer products that qualify for attic or crawlspace use when combined with an appropriate coating material.

In 2008, when the modified 286 test was under development, it was widely assumed that only foams with intumescent coatings would achieve a passing score. That turned out not to be the case. Subsequent tests revealed that many closed-cell foams pass the burn test with no protective coating at all. Because they have lower densities, open-cell foams tend to be easier to ignite — think of kindling a fire with pine rather than hardwood — but a few reformulated open-cell products now pass the burn test as well.

As a result, builders now have three options for attic and crawlspace use. They can combine any spray foam with a prescriptive barrier, use an approved combination of foam and intumescent coating, or choose a foam tested and approved by the ICC-ES without any protective barrier.

Making the right choice. Given that both prescriptive barriers and intumescent coatings add a layer of cost, choosing a foam approved for use without an ignition barrier might seem an obvious way to boost profits. But spray-foam industry consultant Mason Knowles notes that non-barrier foams may cost substantially more than those that require added protection, cutting into any potential savings. Knowles also says that spray foam protected by an ignition barrier may provide a greater margin of safety in an actual fire situation. "The foam with a prescriptive barrier and the non-barrier foam may both meet code," he says, "but the added cost [of an ignition barrier or intumescent coating] probably does buy some improved performance."

Other issues to keep in mind when selecting a foam-and-intumescent-coating combination or a non-barrier foam:

- Approval of a specific intumescent coating with a specific foam doesn't mean it's also approved for use with other, similar foams, although advertisements may imply otherwise. Look for an ICC-ES report that references the actual coating and foam you'll be using.
- Foam that's "close enough" might not be. Be aware that manufacturers often market a given foam product under several different brand names. Even if the version you're using is from the same manufacturer and chemically identical to the one on the ICC-ES report, you could find yourself in hot water with the inspector unless the names match as well.
- Don't exceed the thickness or density of the foam specified in the test report. If a non-barrier foam was tested and approved at a thickness of 6 inches and a density of .5 pound, that approval no longer applies if the thickness is increased to 8 inches. (You can, however, apply the foam at a lesser thickness than what is specified in the report.) —*Jon Vara*

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Q&A

Q. Repairing EIFS

My EIFS sub won't do small repairs — where the siding has been dinged by a homeowner moving patio furniture, for example. Is there some small-scale repair method that I can do myself as a GC?

A. *Barry Jenkins of Southern Stucco in Knoxville, Tenn., responds:* Most minor scuffs, nicks, and surface abrasions can be touched up to match an original EIFS finish. We prefer to use the special paintlike top coats offered by most EIFS manufacturers, which are intended for periodic renewal of weathered acrylic EIFS finishes. Unfortunately, manufacturers don't usually sell these acrylic-based top coats to the general public — and they aren't available in small quantities anyway — so the easiest approach for small repairs is to contact your local EIFS distributor for help in finding a compatible latex or elastomeric paint. With careful color-matching, minor dings should disappear under a high-quality finish.

To fix deeper gouges, we cut out a small rectangle of the EIFS — no bigger than is needed to remove the damaged area — then fill it with a patch made from EPS foam. We glue the foam in place with a "dry base" adhesive consisting of portland cement, sand, and a dry polymer, which can be obtained from most EIFS suppliers. After the patch has dried for 24 hours, we tape off a rectangle around it, allowing about an inch of clearance between the edges of the patch and the tape. We then use at least 40-grit paper to sand the old EIFS finish in the taped-off area down to the base coat. To complete the repair, we apply fiberglass mesh tape and new EIFS base-coat material, troweling the base coat as tightly and smoothly as possible, especially around the repair's perimeter. We allow another 24 hours for the base coat to dry, then apply the acrylic finish, troweling it flat to duplicate the existing texture. While the new acrylic finish is still wet, we remove the perimeter tape and feather in the repair with a damp, soft brush.

If we're lucky, the color of the new finish will match the original EIFS, but most of the time the repair still needs to be painted. Colors that may appear to match at first may fade with age, so for larger repairs, we recoat from stopping point to stopping point — from inside corner to outside corner, for example.

Q. Cleaning Old Beams

What's the best way to clean embedded dirt and stains from an existing post-and-beam frame?

A. *Dan Kolbert, of Kolbert Building in Portland, Maine, responds:* We found the solution to this problem through trial-and-error when, as part of a major gut-rehab project, our company was asked to clean up an existing timber frame in place. The post-and-beam structure had been erected in the 1970s from pieces of other frames, and some of the original members dated back to the 19th century. The wood had a pretty thick layer of dirt and grime, and we were looking for a way to preserve its character while improving its appearance.

We tried a few simple solutions without success. Oxalic acid didn't do much, nor did soap and water. Air hoses didn't touch it, and wire brushes would have taken forever.

Finally, we were referred to Dyers Soda Blasting, a local business about an hour north of Portland. Dyers offers three different types of blast media for different situations: walnut shells, ground glass (which can strip paint off metal while not damaging the metal), and sodium bicarbonate (ordinary kitchen baking soda). We knew walnut shells wouldn't work — we'd wasted a day with a rented sandblaster only to find that the ground walnut shells left the wood surface pitted and removed dramatically different amounts of summer and winter growth.

Jim Dyer, the company owner, came to our site with a blaster and tested the soda on a beam we had removed to build a dormer. The clients liked the look of the sample, and the price was around what we had scheduled for cleaning, so we made the deal. Jim and his crew got the entire house blasted in less than a day, and all that was left behind was a small pile of baking soda and sawdust.

The final results made our clients happy. The beams still look old, but the surfaces are clean and don't make you nervous about leaning on them with clean clothes.

Q. Roof Truss Repair

The previous owner of a house I'm working on cut out several internal webs from three consecutive roof trusses to create storage space in the attic. There's no sign that this has caused any structural problems so far, but I'd like to replace

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the missing members and fasten them with plywood gusset plates and construction adhesive. Is this feasible, and does this sort of seat-of-the-pants field repair expose me to any legal liability?

A. JLC *staff responds:* A "seat-of-the-pants field repair" will expose you to liability, should the repair ever fail. That said, field repairs can be made, and they probably would resemble something like what you have suggested. Ideally, an engineer affiliated with the truss manufacturer that produced the trusses would design a suitable repair. But if the truss manufacturer is unknown or no longer in business, you should engage an engineer who would both sign off on the design, and inspect and approve your work afterward.

The best place to start is with the manufacturer of the connector plates used on the original trusses, says Bob Allen, a product manager for U.S. Construction Hardware. "I would advise you to take pictures of the condition, along with close-up pictures of the connector plates on the trusses [for identification], and send them to any truss manufacturer, " he says. "They should be able to point you in the right direction."

A typical repair might call for a combination of dimensional lumber and plywood gussets "scabbed" beside the remaining web members to make up for the lost members. The repair design should include material dimensions for added members, plus a detailed fastener schedule showing the size, number, and placement of fasteners.

Gary Weaver, president of Timber Tech Texas, a manufacturer of roof and floor trusses based in Cibolo, Texas, has been crawling around attics doing truss repairs for 38 years. He says plywood gussets can be more time-consuming and not much more effective than double scabs. He also advises that, to ensure that any sag or deflection in the bottom chord of the truss does not get "locked in" by the repair, the ceiling first be "kicked up" with posts slightly longer than the floor-to-ceiling distance. Two-by plates or 2-foot-square pieces of plywood can be used to distribute the pressure and protect the ceiling and floor.

Regardless of the specific design details, under no circumstances should you take responsibility for the repair. The fact that there have been no structural problems yet doesn't mean there won't be some down the road. Chances are good, Weaver says, that interior walls are supporting the load in the situation described. However, this may not be enough in the event of high winds, a record snowfall, or a decision by the homeowners to move all their old college textbooks into the attic.

Richard Feeley of Feeley Mediation & Business Law, a Marietta, Ga., law firm that provides legal counsel to remodeling companies, confirms that a contractor should not attempt a truss repair without engineering support. "If you touch it, you own it," he warns. A contractor who has not partnered with an engineer to make sure that the repair meets code and complies with structural requirements is indeed liable, and the risk could be great. Liability could include not just property damage but personal injury if the truss system fails and someone gets hurt. There can also be licensing implications, Feeley notes — if, for example, the job is permitted and a building inspector finds after the fact that you made an adjustment that required an engineered design.

Feeley points out another legal dimension contractors need to address as well: Be sure you cover the issue in your contract. "You need a change-order policy that covers unforeseen circumstances," Feeley says. "If you find something that no one expected, you want to be sure you get paid for the work it'll take to repair it."

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On the Job

Three Ways to Vent a Soffit

by David Hanson

When I began my apprenticeship with my father in the 1970s, clear 3/8-inch-thick tongue-and-groove cedar was widely available at a reasonable price, and we often used it for soffit material. For true economy projects, we switched to rough-sawn 11/32-inch plywood. If we needed venting, we installed continuous 2-inch aluminum soffit strip vents, which have a thin profile that works well with thinner stock.

As prices for cedar began to climb, we started finishing our soffits with less-expensive primed 4/4 stock, typically MiraTEC trim (miratectrim.com), a composite made from wood fibers and phenolic resins. It costs about 20 percent more than OSB exterior trim in our area, and it's a little harder to nail — it seems almost as dense as maple — but holds up better and is reversible, with both a smooth and a wood-grained finish.

But there's a problem with using 3/4-inch-thick soffit stock: The thin vent strips create deep — and prominent — channels between the boards used to finish the soffit. To avoid this unsightly detail, we cut saw kerfs into the edges of our soffit boards, and slip the flanges of the metal strip vents into these kerfs. This is a time-consuming step, but it allows us to mount the vents flush with the surface of the soffit **(1)**.


1

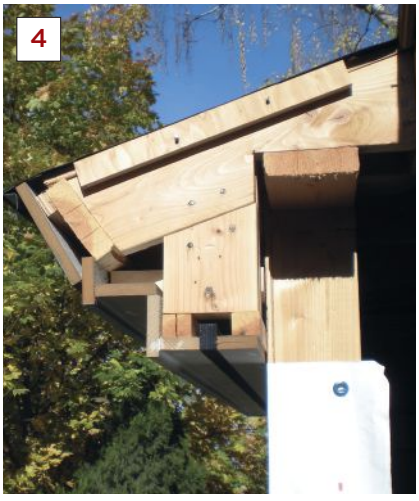
Over the years, we've noticed when we've revisited a few of our job sites that aluminum vents don't hold paint particularly well. So to eliminate the need for aluminum vent strips, we now often finish our soffits with Hardie fiber-cement soffit panels (jameshardie.com), because they are available in both vented and nonvented configurations **(2)**. (I've been told that the cone-shaped holes in the vented panels are specially designed to repel bugs.) While the panels don't look as good — at least to my eye — as the T&G material from yesteryear, they install quickly and hold paint very well. The panels come in lengths up to 12 feet and in widths up to 4 feet, and are less expensive to install than metal vent strips held in place with wood trim. I do have concerns about the strength of the 1/4-inch-thick material, though; soffits normally do not take much abuse, but I think that an errant baseball hitting the panel might put a hole in it.

On a recent remodeling project, our clients wanted the vented eaves detail on their addition to mimic the look of their existing unvented eaves. Neither aluminum strip vents nor perforated fiber-cement panels would have looked quite right, so we tried a different approach, adding Cor-a-Vent S-400 (cor-a-vent.com) corrugated polypropylene strip vents to our soffit assembly **(3)**. These 4-foot-long vents provide 10 square inches of net free


2


3

vent area (NFVA) per linear foot of material, and come in three different colors — white, black, and tan. We found the vents easy to work with — they just tack in place with brad nails — though the jury is still out on how well they'll hold paint.



To install the vent strips, we first added ripped 2x2s to the bottom of our framed eaves assembly **(4)**. We used MiraTEC trim to finish the soffits and trim out the rest of the eaves, including the fascia, even though the original fascia detail featured a large crown molding **(5)**. Gutters will conceal the fascia on the addition, so we simulated the look of the original work using flat stock and saved the cost of a custom molding that would never be seen **(6)**. In the spring — when the weather warms up — the eaves will be painted a dark green and the vent strips should virtually disappear.

***David Hanson** is a partner in Hanson Carlen Construction in Spokane, Wash.*

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The 10-Minute Profit Check

by Dennis Dixon

Regularly comparing job estimates with actual expenses seems like a no-brainer. But after years of training hundreds of contractors about finances, I suspect that many contracting businesses don't make this type of comparison, at least not in a systematic way, and I'm certain that means they're losing money.

How do I know this? The answer is that I've run my own custom building and remodeling business both ways — with and without checking estimates against actual costs — and have seen the difference. Once I developed a system for reviewing these numbers and got disciplined about following it, my company became significantly more profitable.

Dixon Builders Weekly Financial Summary

Week Ending: November 30, 2012

Checking Balance	$ 95,360
Accounts Receivable	$ 181,406
Accounts Payable	$ (69,567)
Projected Cash	$ 207,199
Payroll (4 weeks)	$ (61,705)
Overhead (4 weeks)	$ (4,523)
Cash Balance	$ 140,971

	Project & Cost Category	Estimate	Actual	% Complete	Under (Over) Budget
A	**Parks Custom Home**				
100	Bldg permit	$ 8,570	$ 8,570	100%	$ -
110	Lot clearing	$ 4,516	$ 4,320	100%	$ 194
120	Footings	$ 10,541	$ 10,541	100%	$ -
130	Stem wall	$ 9,500	$ 9,881	100%	$ (381)
140	Floor fill	$ 5,139	$ 5,010	100%	$ 129
150	Floor concrete	$ 9,856	$ 9,856	100%	$ -
160	Floor frame 1st	$ 6,447	$ 4,922	100%	$ 1,525
170	Wall frame 1st	$ 5,969	$ 2,945	49.33%	n/a
180	Floor frame 2nd	$ 7,670	$ -	n/a	n/a
190	Wall frame 2nd	$ 7,898	$ -	n/a	n/a

B	**Lee Remodel**	Details not shown to simplify example	$425
C	**Thomas Remodel**		$268
D	**Weeks Remodel**		($114)

Staff comments:
Parks: 2nd floor framing material delivery delayed
Weeks remodel: spent $114 on carpet cleaning

The author spends a total of 10 minutes each week with a financial summary and itemized list of active jobs like this one. At the top is a projection of cash flow for the coming weeks. The remainder of the form compares estimated to actual costs by project for major job phases. Cost overruns (negative values in the far right-hand column) alert the author to change orders, and often lead to adjustments on remaining work to make up the difference.

How It Works

Every Friday afternoon, I set aside 10 minutes to review project numbers. I began doing this in 1990, soon after I started using a computerized accounting and project management system. The review alerts me to cost deviations on individual jobs so I can actively manage those deviations before they overrun the project. In addition, the lessons I learn help me to estimate more accurately in the future.

The numbers are compiled in a report (see sample, left) I run every Friday after any invoices in that day's mail have been entered into the computer. It begins with a simple cash summary listing my company's bank balance, accounts payable and receivable, plus payroll and other overhead obligations. I use this section to get a quick read on what my short-term cash requirements are and to make sure I will be able to cover them. In the example here, cash flow is good, but when the "Cash Balance" line approaches $10,000, it's a signal that something has to be done to improve cash flow.

The rest of the report is where I spend most of my time. It's organized by project, and because all invoices are coded according to the phase of work — electrical, drywall, roofing, and the like — the projects are broken down into those categories. For each cost category, as well as for each project overall, the report shows the estimated cost, the actual cost, the percentage of the task that's been completed, and the amount by which the actual cost is under or over budget, each in a separate column. This lets me see at a glance how the job itself stands, and alerts me to any cost categories that are over budget.

Correcting Course

For example, look at the Parks job in the sample report. It shows that the cost category "Stem wall" is $381 over budget. That's not a huge overrun and the job overall is still under budget, but it tells me something didn't go as

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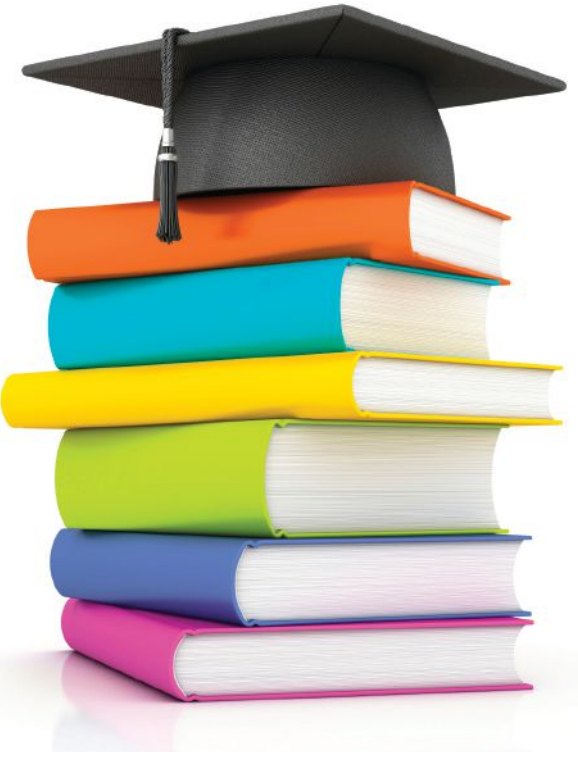

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planned. To find out what, I first look to the "Staff comments" section at the bottom. These are mostly taken from notes written on invoices by job supervisors, and are entered into the system along with the invoice amounts. In this case, the comment tells me the reason for the overrun.

If there's no comment, I may know the reason from having talked with the project manager; in fact, the comments are often just a reminder, because I'm in close day-to-day contact with the project manager on each job, and I rarely have more than three jobs going at once. But if there's no comment and I don't already know the reason behind the overrun, the report has served its purpose by alerting me to something I may need to look into.

Sometimes an overrun is caused by something unforeseen — as was the case with the stem wall. In that case, I may talk with the job's project manager about how we can tighten our belts in other cost categories to get the job back on track. Other times, an overrun may be caused by additional work that is out of the project scope. The action I take depends on how the individual job is performing overall, as well as on how all jobs taken together are performing.

For instance, sometimes a homeowner asks for a few extra electrical outlets. Typically, we will install them as a courtesy. (I actually think this is good marketing, and I make it a point to write a "no charge" change order.) But if the job is already over budget, our change order will charge for the work.

I also look at each job in the context of my entire workload. Say I have three remodels going, and my review shows a $500 cost overrun on one of them because of a roof repair. The budget for that job may be so tight that it would be difficult to make up the loss. But if my report also shows that the other two jobs are under budget, I'll feel better about writing off the $500. I will certainly look to learn from the experience to avoid repeating the problem, but what's important is that the company as a whole is meeting its earnings projections.

Caveats

This system only works if you accurately estimate projects. In fact, one benefit of doing this weekly is that you will find

out very quickly if your estimating has become sloppy.

This system also demands that you understand the portion of your overhead borne by each job, and that you properly allocate overhead charges to cost overruns and job delays. My company overhead is $55 per hour, which I calculate by taking the dollar value of my yearly overhead (a number that includes all office expenses as well as my salary) and dividing by total working hours per year. If an overnight blizzard requires carpenters to spend three hours shoveling snow before they can start work the next morning, and if there's no other job underway that they can go to, the extra cost is their time plus $165 in overhead.

When there is a cost overrun, you can diagnose it only if you have accurate details. To get them, your employees' time cards have to record exactly how they spend their time. That's especially important for extra work that's eligible for a change order. By the way, this only works if managers don't chew out employees for making honest mistakes. A carpenter who gets in hot water for doing work that's essential but out of the scope of work will be less forthcoming about it in the future. You have to make sure everyone, including your crew and your subs, is working as a team and not blaming others.

There's an old caution that "ghost supervision breeds apathy," but doing this weekly review sends a clear message that I'm an active manager who pays attention to details. Employees and subs know I'm watching the numbers and will be talking with them if there's a discrepancy. The fact that I'm always sharpening the pencil makes them a lot more careful about the budget.

I used to work from a more complex, more detailed report, but it took too long to plow through it. In fact, I used to dread Friday afternoons. Since I've whittled it down to one page, I can get all the information I need in about 10 minutes. I end the week knowing that either every job is on track or I've implemented a plan to get it back on track. That makes for more-profitable jobs — and stress-free weekends.

***Dennis Dixon** is a licensed general contractor in Flagstaff, Ariz., and a frequent contributor to* JLC.

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Precut Framing

Factory-cut engineered joists and rafters can reduce labor costs and job-site waste

by Robert Reap

A few projects ago, we framed the first and second floors of an octagonal house using a precut framing package that included I-joists, LVL beams, and LSL rim joists. Even though that project had a complex floor plan, construction went smoothly enough that I was eager to try the system — iLevel's NextPhase JobPack — again. We had that opportunity last summer when we began work on a custom 4,000-square-foot home, located on a hillside site with a lot of wind exposure.

While we were developing the plans, the homeowners made it clear that they wanted a solid, noise-free house. To avoid squeaky floors, we usually frame with I-joists rather than sawn lumber or trusses. And while we typically use sawn lumber to frame our roofs, I thought LSL rafters would be a better choice for this project, especially when I learned that precut engineered roof framing had been added to the list of JobPack options. I like to maintain our local reputation as a builder willing to try innovative products and techniques, but I was also hoping — based on our previous experience with the octagonal house — that in addition to providing a solid frame, the precut floor and roof packages would save us a little money. This time around, though, results were a bit more mixed, for reasons I'll explain in this article.

Three Sets of Plans

After the initial architectural plans had been approved by the clients, structural engineers John Higgins and Mark Johnson used them to produce a set of building plans. These were given to BlueLinx (bluelinxco.com), the distributor that provides the JobPack framing package in our area. BlueLinx imported them into iLevel's proprietary Javelin design and fabrication software. According to iLevel, drawings in a variety of formats can be imported into Javelin.

The Javelin software produced the

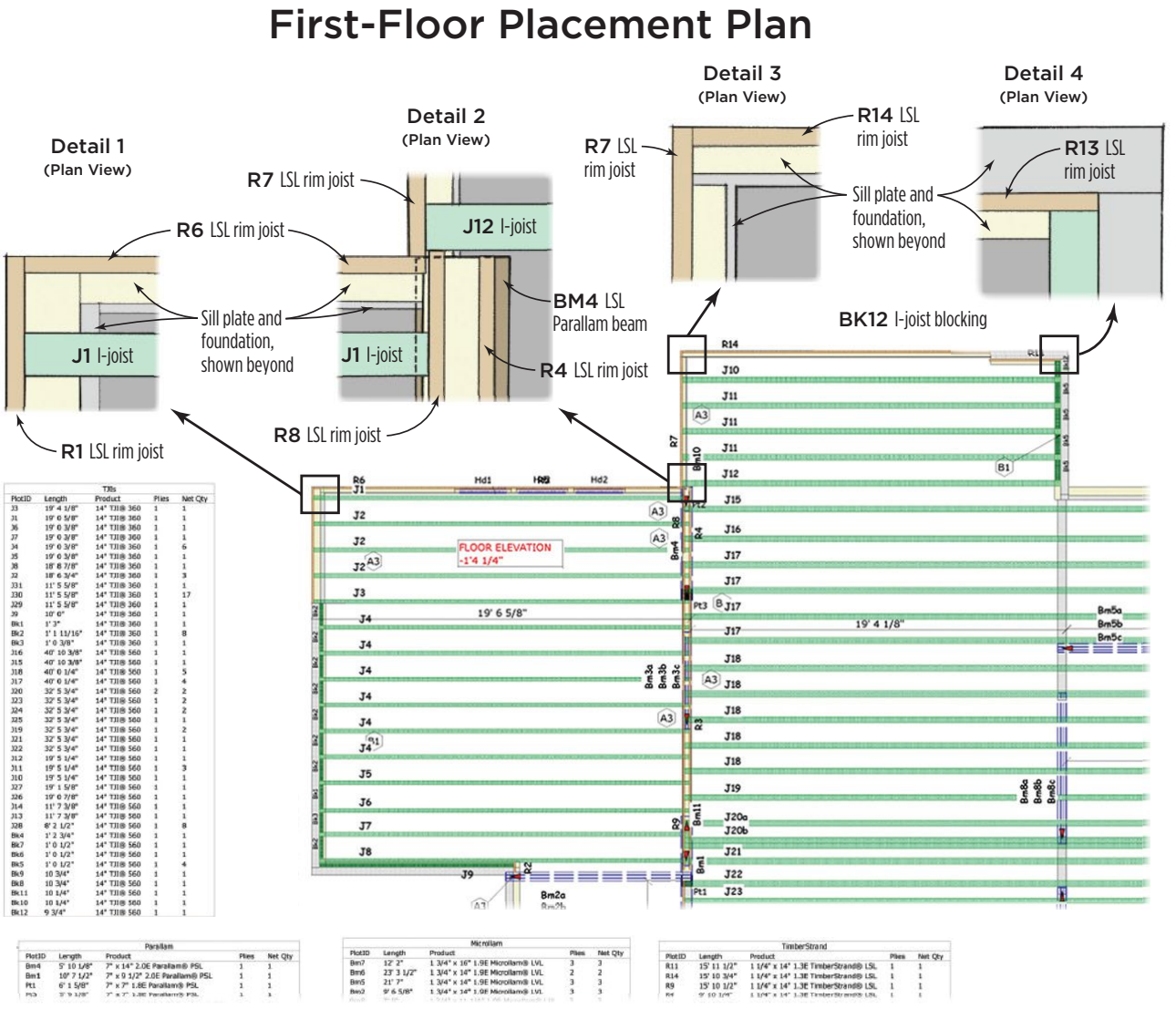


Figure 1. Included with each JobPack framing package is a coded list of materials and placement plans that show the location of each component. To illustrate rim-joist orientation and other tricky connections, the placement plan also provides specific details — shown as enhanced Detail 1, Detail 2, Detail 3, and Detail 4 above.

set of framing plans that the fabricator would actually use to cut our material, so we had to review those plans carefully before placing our final order. One thing we quickly noticed was that the rafters shown on them didn't have rafter tails, a detail included in the original architectural plans for the house but not in the engineering plans. Instead, the initial set of BlueLinx plans indicated rafters that would end at the walls with a plumb cut, and no tail.

Applying rafter tails in the field isn't my idea of a time-saving measure, so lead carpenter Matt Dyer worked with the fabricator to include the rafter-tail profile shown on the original plans. BlueLinx was able to cut this more complex detail, but it added costs to the roof framing package, partly because we then had to upgrade from I-joist to LSL garage rafters.

More problematic, the added profile changed the way the seat cut was made on the fabricator's machinery. We're still not sure if the error was ours or the fabricator's, but we think that the software simply added the new profile to the end of BlueLinx's existing rafter design rather than recalculating the overall rafter length. The result was that each precut

common rafter was about an inch short, a problem we didn't discover until we had already installed the structural ridges and started framing the roof.

Another problem we noticed during our initial review was that some of the beams in the engineering plans were missing or resized in the new plans. It wasn't clear to us that the Javelin software had partially re-engineered the building, but we knew that structural changes that remained hidden in floors and walls could change load paths and potentially affect the appearance of exposed features — in particular, a prominent vaulted ceiling in the main living area — and would need to be carefully reviewed.

Since there wasn't money in the budget for our own engineer to review the fabricator's plans and resolve these discrepancies, that responsibility fell to us. The designers at BlueLinx were very cooperative, and we were able to work with them to correct most problems both before placing our final order and after the material was actually delivered, but there were still a few snags.

For example, a structural post had been added in an area that was supposed to be open all the way up to the roof framing, and a couple of support beams had been downsized by the software because the post erroneously reduced their spans. In another area, a 2x6 wall had somehow mistakenly become a 2x4 wall. Changes that we didn't notice until after construction began took some consultation with the fabricator — and a Sawzall rather than a few mouse clicks — to correct.

In retrospect, it would have been best if we had included a line item in the budget for our engineer to review and approve the plans before we placed our order. In the end, we became responsible for any late revisions or errors in the plans, regardless of who made them.

Material Delivery

When the floor framing package arrived on site, we found that the I-joists, beams, and rim joists weren't as logically bundled as they were when we used JobPack framing the first time. The plans for our first project were zoned and color-coded, with framing for each zone bundled together. On this project, the placement plans that accompanied the framing package weren't zoned, though they were still very clear and easy to follow **(see Figure 1)**.

Without the zoned packaging, three crew members spent at least a half day sorting and organizing each floor's framing material. We essentially created our own "zones" so that we could find the individual components quickly once we started working through the plans. We also had to repeat this procedure later when the roof framing arrived. On the positive side, the material was very straight and consistent, which always makes a framer's life easier.

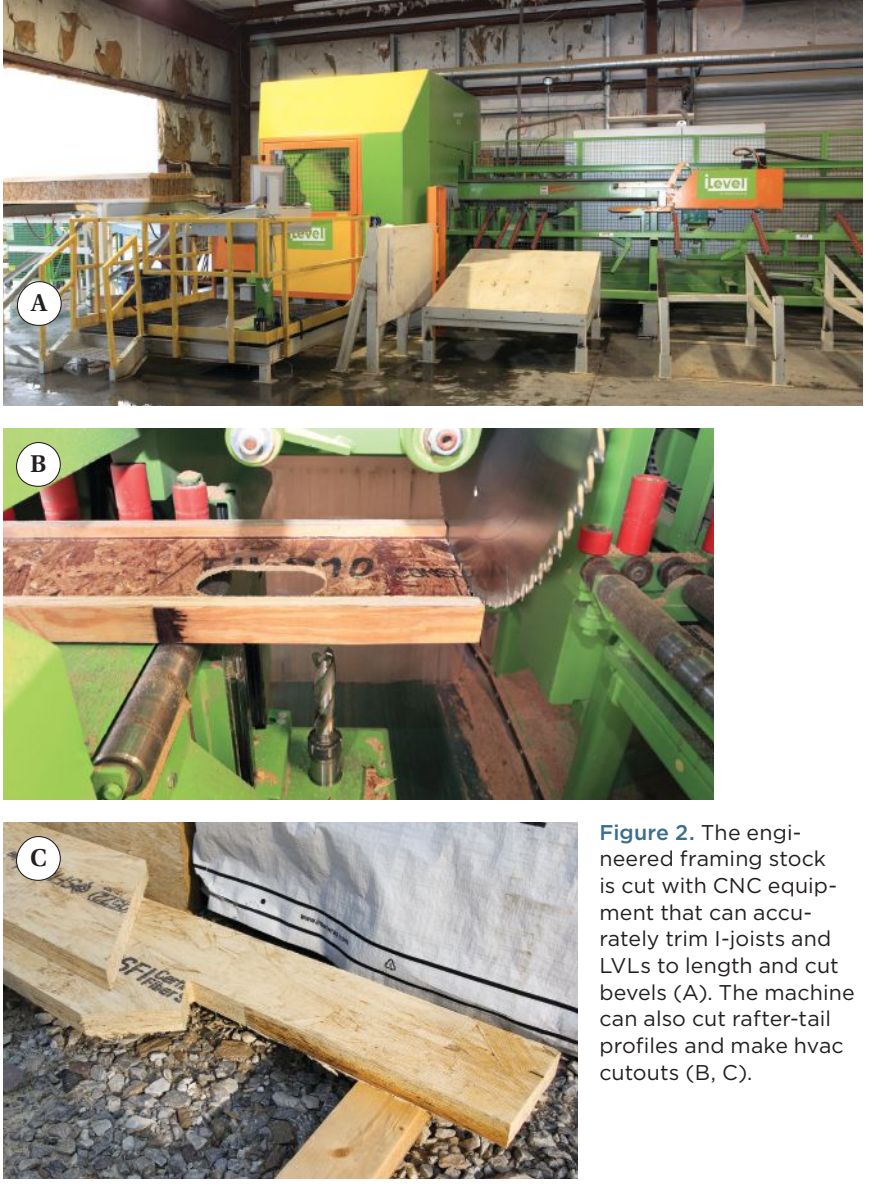


Figure 2. The engineered framing stock is cut with CNC equipment that can accurately trim I-joists and LVLs to length and cut bevels (A). The machine can also cut rafter-tail profiles and make hvac cutouts (B, C).

Foundation

When you're framing with precut material, there's not much room for adjustment to accommodate an inaccurate or out-of-square foundation. This could have been a problem on our project, which included 12-foot-tall poured concrete walls, a shelf detail rather than simple mudsills on top of some of the walls, and a sloped site. Fortunately, we were working with an experienced foundation sub who consistently delivers accurate and square foundations. According to iLevel, a field rep can provide squaring plans to the foundation subcontractor before the pour if needed, and check foundation dimensions afterward. If the framing plans haven't been finalized before the foundation has been built and there are problems — such as bowed walls — component

Figure 3. The LVL beams that support the first-floor framing are included in the JobPack package, along with supporting columns, metal connectors, and even the dimensional lumber used to frame the supporting walls (A). Joist layout is premarked on the LVL beams and LSL rim joists (B), which streamlines joist installation and allows the crew to quickly get the deck sheathed (C).

dimensions can be adjusted prior to delivery of the framing package.

A JobPack option we didn't try on this project was precut hvac joist cutouts. We didn't need them because our extra-high foundation walls create plenty of space for running ducts and other mechanicals without having to make cuts in the floor framing. Where finish ceilings are required, we just install commercial-style drop ceilings. If clearance is an issue and the project is very well-planned, the same CNC equipment that cuts the I-joists to length and mills the rafter tails can also make holes for ducts and plumbing runs **(Figure 2, previous page)**.

Floor Framing

We started out by framing the basement studwalls and installing the Parallam columns needed to support the floor framing (**Figure 3**). The fabricator didn't precut the parallel strand lumber (PSL) columns or beams that we used on this project, probably to allow us to field-check dimensions and because this material is so expensive. Unfortunately, the stock they delivered for each component typically measured about 3 feet longer than it needed to be. For our five 7- to 9-foot-high columns, for example, we ended up wasting almost 15 feet of material.

Some of the longer LVL beams weren't precut either, which makes sense on a custom job like this since it allowed us to make sure we were accurately cutting this expensive material to length. But even though a few of the structural elements had to be measured and cut, we liked the way the placement plan allowed the crew to systematically locate, orient, and install each component with minimal head-scratching or supervision.

Once the girders and beams were in place, we began installing metal hangers — also included in the JobPack — and putting up joists. The joist layout was premarked on the structural supports and rim joists, so all we had to do was to find

the starting point, which was indicated on both the placement plan and the framing, and work from there. Even the blocking was precut and marked on the plans (though we did have to supply our own web stiffeners).

After the floor framing was in place, we finished installing the remaining plates where the joists sat on shelves formed in the top of the foundation wall. Then we fastened down the sheathing — also included in the package, but not precut — and glued and nailed it in place.

Wall Framing

Other new JobPack options that we didn't try on this project were precut wall framing and panelized walls. Instead, we hired Catamount North, a local construction company with whom we've shared a lot of work lately, to panelize most of the walls on site. While Matt and our crew worked on the floor system, workers from Catamount North churned out the wall panels to keep the project moving along quickly.

Catamount framed the wall panels with 2x6 lumber and sheathed them with Huber's new R-Sheathing insulated sheathing (zipsystem.com). We used LSL studs to balloon-frame the two tall rake walls, because engineered studs are much straighter and stronger than sawn lumber (we also used LSLs to frame critical interior kitchen and bathroom walls). We preassembled the eaves on the tall rake walls, then scheduled a crane to lift them and the first-floor walls off the stack and into place.

Next we began placing the supporting beams for the second-story floor joists (**Figure 4**). The framing plan for the second floor was a little more complicated than the framing plan for the first floor because of some elevation changes and vaulted areas, but joist installation went quickly as we became more familiar with how the precut package went together. Finally, after the second-floor deck was

Figure 4. Once the first-floor walls were in place, the crew could install the second-floor support beams (A). While many of the beams were precut (B), a large 5¼-inch-wide by 24-inch-deep by 28-foot-long beam built up from three 1¾-inch by 24-inch LVLs was not, which allowed the crew to verify the length of the span, then cut and fit the beam one ply at a time (C).

Figure 5. A crane was used to lift into place the panelized second-floor walls, including two rake walls with prefabricated eaves (right) and a major interior bearing wall (far right).

Figure 6. Since beveled valley rafters aren't a JobPack option, the author got these LVLs from his local lumberyard and cut them on site (A, B). The valley jack rafters were precut, but needed to be trimmed to size because of layout changes in the rest of the roof framing (C).

sheathed, we hoisted the remaining wall panels into place and got started on the roof framing **(Figure 5)**.

Roof Framing

Before tackling the main roof, we framed the simple gable roof on the detached garage. This gave us a taste of the potential time savings that precut roof framing offers on the right kind of job, since it took only a couple of hours to put up the rafters on the 24-foot by 36-foot structure. The house roof, however, was much more complicated, with a stepped ridge, a couple of shed dormers, and a pair of large cross-gables with long valleys (**Figure 6**).

Framing this roof with precut framing took longer than we expected, for a couple of reasons. For one thing, BlueLinx couldn't bevel the upper and lower edges of the LVL valley rafters to our specs. So before the roof framing package was actually delivered we went ahead and picked up the $1\frac{3}{4}$-inch-thick by 14-inch-deep LVL stock we needed at our local lumberyard and cut it ourselves on site. At the same time, we picked up enough LVL stock for the ridges, which allowed us to get these critical structural components in place and verify that the precut rafters on order would actually fit.

As it turned out, of course, the rafter lengths were off due to the issue I described earlier with the rafter tails, which we didn't discover until the ridge was in place. To fix that problem, we picked up more LSL stock at our local supplier and cut new common rafters as needed.

The valley jack rafter lengths were short too. Not by much, but we still had to shift each jack rafter to the next-shorter position in the layout and trim it to fit, then cut the longest valley jack rafters from unused precut stock. In the end, we had to put a tape on each rafter and trim or recut almost every one of them. The lesson: A single small error on a complicated roof plan like this can have huge consequences.

Keep in mind, too, that rafters cut from LSL stock are a lot denser and heavier than comparable rafters cut from sawn lumber. A roof that has been framed with LSLs feels really solid and is dead flat, but a 20-foot-long LSL rafter is very heavy and difficult to handle (**Figure 7**). It often took three workers to lift the longer rafters into position, and instead of a framing nailer, we had to use impact drivers and structural screws to fasten the rafters into place, which definitely slowed down the pace of the job.

Figure 7. Some of the common rafters had to be cut on site from stock material (A). LSLs are a lot heavier than I-joists or sawn lumber; wrestling the 20-foot-long common rafters into position was a three-man job (B). Crew members tacked the dense material in place with a nail gun (C), then used impact drivers to drive structural screws through the rafters into the framing.

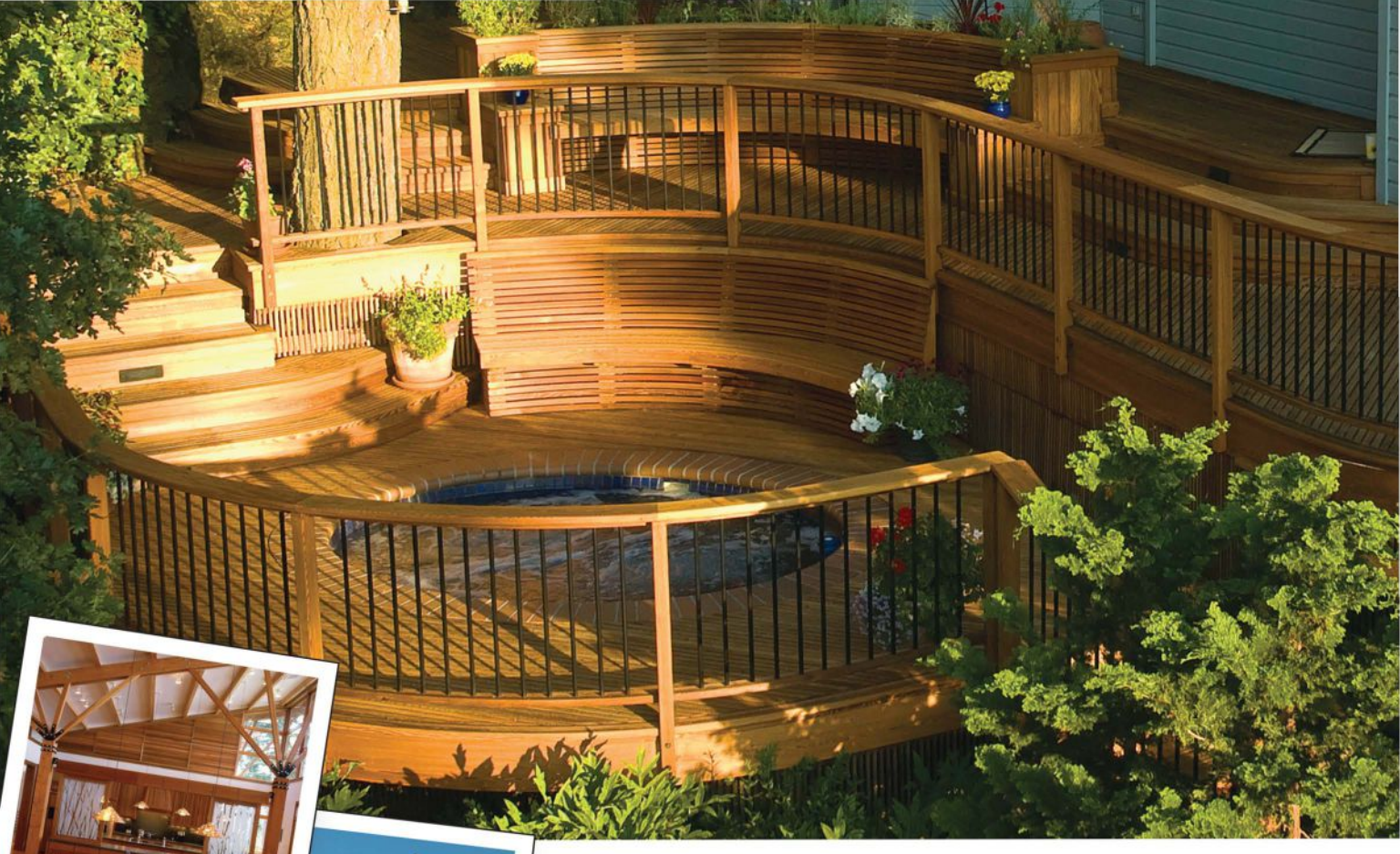
Costs

We've estimated and framed a lot of conventional I-joist floors, so we expected that our estimated vs. actual costs to build the first and second floors with precut framing would be very close. And, in fact, they were, though since we lost a little time sorting the material we probably saved less labor than we hoped. On the other hand, we didn't miss having to clean up a big pile of offcuts — there simply wasn't very much framing material left lying around when we were done.

The precut roof system was more expensive than we expected, largely because LSLs cost significantly more than comparable sawn lumber in our area — about $1.28 per lineal foot for a 2x12, and about $3.25 per linear foot for a 11¼-inch LSL. Since we used about 2,500 lineal feet of rafter material, this added about $5,000 in material costs to the job. We also hadn't included the extra cost of correcting the rafter tails or the upgrade from I-joist to LSL garage roof rafters in our initial estimate. With labor costs added in, I think that a conventionally framed roof would have probably cost about 20% to 25% less than this one. But then again, it would not have been as sturdy, which was one of the design goals.

Precut framing can save both time and money, but it has to be used on the right kind of project. I'm convinced of its value when framing even complex floors, and have seen how well it works on a simple roof. I'll try precut roof framing again, but now that we know about the potential planning pitfalls, we'll probably choose a simpler project.

Robert Reap *is job-site supervisor and co-owner of Reap Construction in Richmond, Vt.*



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TOOL TEST

Laser Distance Meters

These compact, precise measures complement traditional tapes

by Bruce Greenlaw

Leica Geosystems introduced the first hand-held laser distance meter in 1993. Although there are now at least 17 brands and 42 models on the market, most of us still exclusively use our familiar steel tape measures. But recent articles in *JLC* and forum postings at jlconline.com indicate that the mindset among pros is gradually changing as they gain trust in laser-measuring technology and realize the benefits.

Laser distance meters, or LDMs, work by bouncing a visible laser beam off a stationary surface. They receive the reflection through a lens, calculate the phase shift or time of flight, and translate the results into a digital measurement. The simple point-and-click operation normally delivers a measurement in less than a second and allows you to measure by yourself with minimal walking and climbing.

LDMs can quickly measure existing architecture for preparing floor plans and elevations, and some are ideal for estimating and takeoffs. Finish carpenters have discovered that well-equipped models are faster and more accurate than tapes when running baseboard, crown moldings, chair rail, and long top casings, or when squaring up jambs for wide or tall doors. Some models can find the angles for stair skirts and handrails.

The meters have limited value for framing, but they do make it easier to frame

(text continues on page 44)

Laser Distance Meter Specs






	Bosch GLM 50 boschtools.com	**Bosch GLM 80** boschtools.com	**Hilti PD 5** us.hilti.com	**Leica Disto D2** leica-geosystems.us	**Leica Disto E7300** leica-geosystems.us	**Leica Disto E7400x** leica-geosystems.us
Origin	Malaysia	Malaysia	Germany	Hungary	Hungary	Hungary
Range	2 in. to 164 ft.	2 in. to 262 ft.	14 in. to 230 ft.	2 in. to 197 ft.	2 in. to 328 ft.	2 in. to 328 ft.
Accuracy (± inches)	1/16	1/16	1/16	1/16	1/25	1/25
Smallest fraction (in.)	1/32	1/32	1/16	1/16	1/32	1/32
Continuous beam		●			●	●
Area	●	●		●	●	●
Volume	●	●		●	●	●
Addition/subtraction	●	●		●	●	●
Tracking	●	●	●	●	●	●
Minimum/maximum		●		●	●	●
Stake-out				●	●	●
Indirect measuring	●	●		●	●	●
Inclinometer		●				●
Memory (# of results)		20*		10	10	20
Dust/water protection	IP54	IP54	IP55	IP54	IP54	IP65
Tailpiece		●		●	●	●
Timer		●		●		●
Tripod socket	●	●				●
Web price	$115	$175	$200	$180	$200	$280

* Also stores one constant
** Operates only with indirect measurement, not tracking

LDM Terminology

Continuous beam
Reduces clicks needed to record a series of dimensions (for more information, see page 48)

Area, Volume, Add/Subtract
Automatically calculate area or volume; add or subtract results (p. 45)

Tracking
A continuous reading while moving toward or away from a target (facing page)

Minimum/maximum
Ability while tracking to capture the minimum and maximum distance measured (facing page)

Stake-out
Mark recurring spacing along a line (facing page)

Indirect measuring
Uses geometry to measure vertical or horizontal dimensions from a distance (p. 44)

Inclinometer
Used to measure slopes and angles; improves indirect measuring (p. 44)

Memory
Storage of successive measurements or calculations in order (p. 46)

Tailpiece
Enables accurate inside-corner measurements to check diagonals (p. 47)

Timer
Delays recording of dimension (p. 48)

							
	Milwaukee 2280-20 milwaukeetool.com	**Spectra Precision QM55** spectra-productivity.com	**Spectra Precision QM75** spectra-productivity.com	**Spectra Precision QM95** spectra-productivity.com	**Stabila LD 400** stabila.com	**Stanley TLM 165** stanleytools.com	**Stanley TLM 330** stanleytools.com
	Hungary	China	Germany	Germany	Hungary	Hungary	Hungary
	2 in. to 197 ft.	15 in. to 164 ft.	13 in. to 230 ft.	2 in. to 656 ft.	2 in. to 197 ft.	4 in. to 164 ft.	2 in. to 328 ft.
	1/16	1/16	1/16	1/25	1/16	1/16	1/25
	1/16	1/16	1/16	1/32	1/16	1/16	1/32
							●
	●	●		●	●	●	●
	●	●			●	●	●
	●	●		●	●	●	●
	●	●	●	●	●	●	●
	●	●			●	●**	●
	●	●			●		●
	●	●			●	●	●
							●
	10	50			10	5	20
	IP54	IP54	IP55	IP54	IP54	IP54	IP54
	●	●		●	●	●	●
	●				●		●
		●					●
	$180	$145	$150	$230	$250	$125	$265

LDM Features

Tracking, min/max, stake-out. All of these tools can take a continuous reading while moving toward or away from a target, which is called "tracking." Eight tools can also freeze the minimum and maximum distance measured, which makes the function far more useful. For instance, you can check a room or door jamb for square by sticking the laser's tailpiece into a corner, sweeping the beam across the opposite corner, reading the maximum length, then repeating for the other diagonal. Tracking the minimum reading between two surfaces is also useful — for fitting built-ins between two out-of-plumb walls, for example. (For some reason, the new Stanley TLM 165 min/max mode only works with indirect measuring, not tracking.) Seven models offer a "stake-out" mode, used for laying out a series of equal intervals by setting the spacing dimension and moving the laser away from a fixed target. A change in tone pitch or frequency indicates when each interval has been reached. It's reasonably accurate but slower than using a tape.

LDM Features

Inclinometers. The Bosch GLM 80, Leica Disto E7400x, and Stanley TLM 330 have built-in tilt sensors, or inclinometers, that not only measure slopes and angles, but raise indirect vertical and horizontal measuring to the next level. Say you need to measure the horizontal distance to a wall, but there's a couch in the way. You can angle the meter up until the laser dot clears the couch and hits the wall, click once, and get the precise horizontal measurement (assuming the wall is plumb). Bosch's optional R60 attachment (shown) instantly converts the GLM 80 into a 24-inch electronic spirit level to make the inclinometer even more versatile.

Indirect measurements. When poor access, obstacles, or the lack of a dependable target prevent direct measurements, units with inclinometers can use internal trig functions to calculate various dimensions indirectly from a distance. Several models can use Pythagorean geometry instead to indirectly calculate certain measurements like wall heights, requiring two or three shots taken from a distance. But you only get precise results with Pythagoras functions if you always pivot the meter off a fixed point and ensure one 90-degree angle. Leica, Milwaukee, Stabila, and Stanley allow you to use the min/max function when taking these measurements, which helps. But in any case, careful freehand shots are fine for estimating.

(continued from page 41)

walls in place, fit tall posts, and measure between rim boards to size long joists. You can also use them to plan staging, determine which of your ladders will reach a roof, measure between deck posts for infilling top and bottom rails, and so on. Tapes are still required, however, for taking very short measurements, transferring dimensions to your stock at the cutting station, and measuring to a layout mark, an edge, or an outside corner (unless you put a target there).

You can buy a basic LDM for around $100 (or less) that's accurate to within 3/32 inch. At the other extreme, $350 to $800 buys advanced features, such as built-in scopes or cameras that make it easier to aim at distant targets or in bright light, and integrated Bluetooth for transmitting data to Excel, AutoCAD, and other programs.

For this article, I evaluated 13 state-of-the-art models that cost about $115 to $280 and are accurate to within 1/16 inch or better. In my opinion, that's the sweet spot for most residential and light-commercial work. I used the tools for several weeks, then compared their features, performance, and ease of use.

Range

The spec chart on the previous two pages lists the range and accuracy for each model. To measure at the *maximum* distance, though, you need to aim the laser at a target plate like the ones sold by Bosch, Hilti, and Leica. These plates increase the measuring range and effectively magnify and brighten the dot for easier viewing. Aiming at typical building materials can reduce the range by 20% or more. Bright light, high temperatures, and unpredictable surfaces such as shiny metal can all cause measuring problems, but you'll normally receive an error alert rather than an incorrect measurement when conditions are unfavorable.

Outdoors, the biggest issue is being able

to spot the laser dot from a reasonable distance or in bright light. Using a target plate is one solution, but you have to position it and account for its thickness, which is extra work.

Laser-enhancement eyeglasses, on the other hand, make it easier to spot the dot without adding any extra steps. Wearing Hilti's optional PUA 60 glasses, I could (with plenty of concentration) find the dot from more than 150 feet away when measuring to shaded yellow metal siding, virtually doubling my viewing range. When I tried to measure to a sunny section, I could barely see the dot at 10 feet without the glasses, but with them I could pick it out of the glare at 50 feet. Prices for laser-enhancement glasses start at about $10.

Five of the meters I tested can mount to a tripod, which also makes it much easier to hit a distant target.

I found that most of these LDMs can measure lengths down to about 2 to 4 inches, but three of them needed more than a foot of separation to record a measurement.

Accuracy

According to Stanley Tools, short FatMax tapes are accurate to 1/16 inch, not counting sag or temperature fluctuation. Long tapes are typically less reliable, declining to 1/2-inch accuracy at just 33 feet. By comparison, nine of the LDMs are supposed to be accurate to 1/16 inch, and four to 1/25 inch.

Some manuals recommend that you periodically verify the accuracy by setting up a fixed target at a known distance from the meter (Hilti recommends about 3 to 15 feet) and measuring the distance 10 times to check for deviation. I clamped a 2-by stop to one end of a kitchen island and used my FatMax tape to position a hardwood block 11 feet away to serve as a target, then took 30 shots with each model. I repeated the test another day with a white target plate. All 13 models passed the tests, straying within limits only occasionally.

Units of Measurement

All 13 models can measure in fractional inches, feet and inches, decimal feet, and metric units. The Leica Disto E7300 and E7400x and the two Stanley models also display decimal inches, while the Bosch GLM 80, Hilti PD 5, and Spectra Precision QM75 and QM95 can show decimal inches and yards. For finish carpentry, I appreciate the models that display fractions down to 1/32 inch. Six of the models do that, while the rest go down to 1/16 inch.

Tester's Comments

Bosch GLM 50

At the moment, this model has the lowest price in the group. It's also the most intuitive, with no baffling key combinations. But although it shows fractions down to 1/32 inch, calculates areas and volumes, can add and subtract, and can measure indirectly, there's no timer, memory, or tailpiece, and tracking doesn't register minimum and maximum lengths. The display's backlight is controlled by a light sensor with no manual override. This sometimes left me in the dark — for instance, it dimmed and then turned off while tracking. Also, there's so much ghosting when viewing the display from below that it can be hard to read. The laser clicks when it records a measurement, but it doesn't beep to confirm operations like the other models do, which might be a problem on a noisy site.

Bosch GLM 80

The rechargeable GLM 80 is the only model under $200 that has an inclinometer. It isn't the most rugged model, but it displays fractions down to 1/32 inch, can handle direct and indirect measuring with ease, and has all the other perks I would want, from a timer to an erasable memory. For $250, you can buy a kit that includes Bosch's R60 attachment, which quickly expands the meter into a 24-inch digital box-beam spirit level. I found that this combo isn't as convenient as the advanced 24-inch Stabila

Target Accessories. Laser-enhancement glasses make it much easier to see the laser dot on distant targets or in bright light. Target plates (above right) maximize the measuring range and brighten the dot. The two items shown above are Hilti accessories. In a pinch, a Post-it note (below) makes a quick and easy target at edges and outside corners.

Area, volume, +, -. Eleven of the models can compute square footage, and can also add and subtract dimensions and results. To find the area of a wall, for instance, you measure length and height, then read the result on the display. You can also measure a series of walls this way and add the results as you go. Better yet, the Bosch GLM 80 can store a common ceiling height, then apply it to any number of wall lengths to calculate the total area. The Stanley TLM 330 and the Leica Disto E7300 and E7400x essentially do the same thing, but you have to press the "+" button between the length measurements. Ten of the models can also measure volumes, which can be especially useful for hvac calculations.

LDM Features

Memory. Lasers with memory store measurements even while the power is off. Nine can store the last five to 50 dimensions or results in order. The Bosch GLM 80, Stanley TLM 330, and Leica Disto E7300 and E7400x let you delete the memory so you can start a new list. Except for the Leica E7300, these also store complete calculations, as does the Spectra Precision QM55.

Power. Twelve of the meters run on two AA or AAA alkaline batteries that allegedly deliver up to 5,000 to 10,000 measurements. But the Bosch GLM 80 uses a convenient rechargeable 3.7-volt lithium-ion battery that's supposed to deliver up to 25,000 measurements per charge and takes about three hours to recharge. The compact charger plugs the meter into an AC outlet so you don't have to remove the battery. All of the batteries drain faster if the backlights and beeps are turned on or you leave the power on longer than necessary.

electronic level I use (which has more helpful audio signals, for instance), but it was just as accurate after I quickly calibrated the inclinometer. The microsite at boschtools.com does a great job of demonstrating all of the GLM 80 features.

Hilti PD 5

This two-button laser is designed for installation work, period. It measures distances, has a tracking mode, and is long and slender so you can slip it into a narrow toolbelt pocket and grab it easily. You can also hose it off. But you have to press and hold the on/off button for two seconds to enter the menu and then manipulate both buttons to change the units of measure or control the beep, so it isn't completely intuitive. Also, the display is upside-down when shooting from left to right. Several models have more features for less money, but Hilti has the only lifetime warranty.

Leica Disto D2

The D2 offers all the critical measuring options you need for estimating and installing, plus deluxe amenities like a timer, a memory, and a tailpiece. It also fits into small pockets and feels just right in my hand. When it was introduced in 2008, it displayed fractions down to 1/32 inch; now it displays 16ths instead.

Leica Disto E7300

A step up from the D2, the E7300 is one of four models tested that are accurate to 1/25 inch and display fractions down to 1/32. It also has a longer range than the D2, can delete the memory so you can start a new list, allows you to shoot a common ceiling height just once when calculating the total area of a series of walls, and more. It doesn't have a timer, and you have to remember some two-key combinations to set the units, lock the keypad, and control the backlight and beep. With minor refinements, this model would be one of my favorites.

Leica Disto E7400x

A video at leica-geosystems.us shows this new model being tossed around a job site, dropped from a stepladder into a gravelly puddle, and dunked into a water bucket to clean it off. Besides having a class-leading IP65 rating for dust and water protection and passing Leica's 2-meter drop test, the E7400x is tied for first in accuracy and has a full complement of deluxe features, including an inclinometer. There's a learning curve, but the graphic manual is a big help.

Milwaukee 2280-20

This tool has the same engine, display, and endpiece as the Leica Disto D2. But Milwaukee added an extra key and rearranged the keypad so it's slightly more convenient. It also added rubber bumpers and offers a five-year warranty versus Leica's three-year one. One problem I found was that, when measuring flat surfaces with the 2280-20 on its back, I often had to raise the front of the tool to prevent the beam from "scraping" the surface and throwing off the measurement.

Spectra Precision QM55

The new QM55 offers the basic options you need for estimating or installing at a comparatively low price. It's the first LDM I've seen that has a signal-strength indicator, which displays up to four bars to help you aim at an appropriate target. It also has the biggest memory, storing up to 50 measurements and calculations. According to Spectra, it's drop-tested from 1.5 meters. On the downside, the tool is heavier than most, requires more button clicks, doesn't have a timer, and makes you insert a separate tailpiece for measuring from inside corners. You also can't turn off the beep, which may only be an issue for work in an occupied office or other quiet zone.

Spectra Precision QM75

This new model works just like the Hilti PD 5 and has an identical display. But the

QM75 is shorter, wider, and thicker than the PD 5, so it's a bit less convenient in my toolbelt. Then again, the QM75 has been drop-tested from 1.5 meters while Hilti makes no drop-test claims. The QM75 also costs about $50 less than the Hilti but comes with a three-year warranty versus a lifetime one.

Spectra Precision QM95

This new long-range laser is accurate to 1/25 inch and displays 32nds. Like the other Spectras, it has been drop-tested from 1.5 meters, so it's rugged. But despite its higher-than-average price, it lacks several useful features such as min/max, a timer, and a memory. It's also the biggest and heaviest of the lot.

Stabila LD 400

Like the Milwaukee 2280-20, this model is fundamentally the same as the Leica Disto D2, adding a rubber bumper and extra buttons. But Stabila's crowded keypad is the hardest of the three to navigate, and it gives no indication that the memory button also activates the timer. Last time I checked, the Stabila cost $70 more than the other two models.

Stanley TLM 165

Of the 13 models tested, only the Bosch GLM 50 costs less than the new TLM 165. The two models are similar, except the Bosch shows fractions down to 1/32 inch and has a tripod socket, while the Stanley has a small memory, a tailpiece, and a ghost-free display. Overall I prefer the Stanley, though I wish it displayed 32nds. Stanley's manual, by the way, didn't mention that you can turn the beep on and off by pressing the function and unit keys simultaneously for a second.

Stanley TLM 330

In the spec chart (pages 42 and 43), the new full-featured TLM 330 and Leica 7400x appear to be almost identical. But the Leica rates at IP65 rather than IP54

Reference points. The Hilti PD 5 and Spectra Precision QM75 both measure from the back end only, while the other models can also measure from the front. Ten models include a tailpiece that allows you to take measurements easily from inside corners to check diagonals. The Bosch GLM 80, the three Leicas (one of which is shown), the Milwaukee, the Stabila, and the Stanley TLM 330 can also hook outside corners for easier measuring from the back end. Five models can mount to a tripod and be set to measure from the center of the socket.

Helpful display. All of the models have illuminated displays, but the backlight on the Bosch GLM 80 is the brightest. It's also the only one that can be operated manually or controlled by an ambient-light sensor. What's more, the unique display can be set to rotate automatically for an easy read regardless of the orientation.

Keypad lock. The Stanley TLM 330 and the Leica Disto 7300 and 7400x allow you to lock the keypad. That prevents them from accidentally turning on and draining the batteries when riding in a pocket or toolbelt.

(which means you can hose it off), while the Stanley adds an extra Pythagoras function and a leveling mode that uses beeps to indicate level — handy if you can't see the display. The Stanley also has four more keys for quicker access to several functions, but I think they clutter the keypad without significantly improving the tool. For instance, a new key makes it easier to calculate triangular areas (which I've never done), but you still need to use an obscure key combination to turn the backlight on and off. The Stanley currently costs about $15 less than the Leica, but comes with a two-year rather than a three-year warranty.

The Bottom Line

When *JLC* last tested LDMs back in 2004, the cheapest model cost $360 and was accurate to ⅛ inch. Compared to that, every one of these models is a bargain. All are exceptionally accurate, and all will measure lengths with simple pointing and clicking. There are definitely differences in convenience, though. I quickly came to appreciate extra features like timers, memories, estimating shortcuts, and the ability to measure indirectly around obstacles.

My overall favorite is the innovative Bosch GLM 80. It's an especially quick estimator, easily measures indirectly, reads angles, has a bright rotating display, uses a rechargeable lithium-ion battery that delivers up to 25,000 measurements per charge, and is priced below the average. An optional attachment quickly converts it into a 2-foot electronic spirit level. The full-featured but pricier Leica 7400x and Stanley TLM 330 finished a close second.

But not everyone needs the same features. The best choice for you depends on the type of work you do.

***Bruce Greenlaw** is a* JLC *contributing editor.*

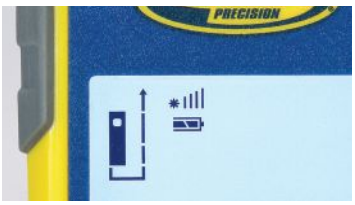
LDM Features

Durability. Most of the manufacturers claim that they've tested the shock-resistance of their lasers by dropping them onto a hard surface from a height of one meter. Spectra Precision drop-tests from 1.5 meters, and Leica drop-tests the Disto E7400x from 2 meters.

Nine of the lasers have an IP54 rating, which means that dust intrusion and water splashes have no ill effects. The Hilti PD 5 and Spectra Precision QM75 rate at IP55, while the Leica Disto E7400x rates at IP65; you can drop all three in the mud and wash them off, and the Leica is also completely sealed against dust.

Continuous beam. When shooting a series of lengths, such as when installing baseboard, you normally have to press the top button twice per measurement — once to turn on the beam and a second time to take the measurement and turn the beam off. But the Bosch GLM 80, the Stanley TLM 330, and the Leica Disto E7300 and E7400x also let you keep the beam turned on so you only have to press the button once per measurement.

Signal strength. Spectra Precision's QM55 is the only LDM in the group with a signal-strength indicator. More bars indicate a stronger signal, which means a faster, more dependable measurement.



Timers. Six of the lasers have a programmable timer that delays the shot after you press the measure button. Because you can press then aim (rather than having to press the button while trying to keep the beam on the target) it's much easier to aim the beam precisely in an awkward position or at long distances.

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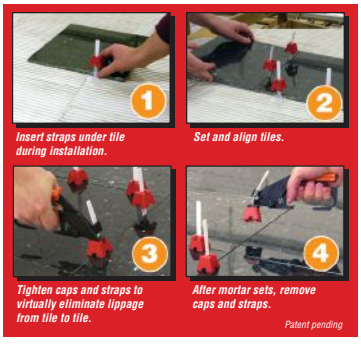

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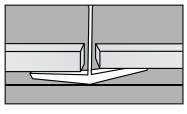

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Campaign Season

Planning a marketing campaign

by Stacey Freed

As every marketing strategist will tell you, it's important to continue marketing during a downturn. Studies done during the recessions of the 1970s, '80s, and '90s all show that companies that maintained or increased their marketing efforts during a slow economy enjoyed higher sales growth in the immediate post-recession years than companies that didn't follow that strategy. This time around, it won't be any different.

How much you spend on marketing and what, exactly, you spend it on may change, but continuing to market now will keep your name and brand in people's minds for when the economy swings back. Done right, a short-term marketing campaign can have long-term gains.

Illustration: Stanford Kay

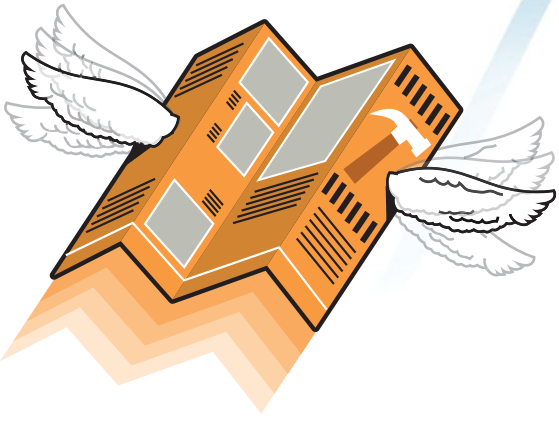
Case Study: Criner Remodeling

Robert Criner, owner of Criner Remodeling, in Yorktown, Va., has been in the industry for 40 years. He has seen recessions come and go and has learned that he needs to budget for marketing all year long, *every* year, and says that "everyone in the company has to be part of your marketing plan."

Criner uses a marketing calendar that shows him, for example, which months his company will enter design award competitions, when the company pig roast will take place, when to send out holiday cards, and so on. **"You want to touch people four or five times a year," he says, "not four or five times a month."**

The campaign outlined on these pages culminates in a seminar, which Criner's marketing coordinator, Joelle McLaughlin, schedules to occur during a slow period. There were four months from the time McLaughlin gathered names and addresses to the actual seminar date.

Criner began the campaign immediately after he landed his first job in this particular neighborhood. While his team was working in one neighbor's home, his vans — with a 3½-foot-by-3½-foot project photo on their sides — and his employees and trucks were visible in the area. (This particular neighborhood does not allow job-site signs to be posted.)



1 Targeted list

TIME: 12 to 16 hours to create the list four months before the seminar

COST: "Free" (salaried employee time)

Criner identified a small neighborhood of about 350 homes that he wanted to focus on.

His marketing coordinator then gathered names and addresses from a municipal website. "There's a property information system here," Criner says, "and we looked at maps of houses and were able to get the name of the owner and the address."

Tip: Get a list from the neighborhood's homeowners' association or visit the city's government Web page and look for the city's property-assessment information. Search the street name to find out the names and addresses of the homeowners.

2 Mail intro/brochure

TIME: Mailed three weeks before the seminar

COST: Approximately $1,000

The first letter that Criner sent to homeowners was introductory and was included with a trifold brochure. The one-page letter did not address the person directly, nor was it signed by Criner. Instead, it told about Criner Remodeling, its history and experience.

The letter also let prospects know that their neighborhood is just a half mile from company owner Robert Criner's own home; that he's lived in the area for many years — before their neighborhood was even built; that he is active in the community and is on the zoning board.

The brochure, designed in-house and professionally printed, featured in-depth information about the company — its specialties, employee designations and education, and various project photos, taken by Criner.

Tip: Make a point of having every piece your company mails direct prospects to your website.

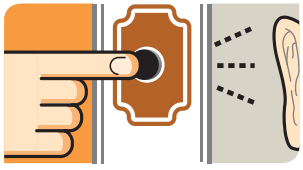
Tip: Mail a brochure to the home address of several employees and put a return address on the envelope.

Illustrations: Stanford Kay

3 Meet & greet

TIME: Two hours, three weeks before the seminar

COST: "Free" (salaried employee time)



Criner and McLaughlin went door-to-door to meet neighbors in the immediate vicinity of the job site. The marketing director was still relatively new to the company then, so Criner used the opportunity to introduce her to the neighbors and to give a one-minute elevator speech.

"People are hungry for personal contact," Criner says. "The 30% ... who were home always welcomed us and we had pleasant, easy conversations. It's a soft sell. You want to make an impression, but you don't have to tell them your accolades. Everything is to drive them to your website."

He handed each homeowner a brochure or left a handwritten note with the brochure at those houses where no one was home. **Tip:** Stand back from the door a little so you don't appear pushy or threatening.

5 Seminar mailing

TIME: Three weeks prior to the seminar

COST: 50 brochures + 550 direct-mail ads + envelopes + stamps = $423 (not including labor); K&B book: $8/book x 50 books = $400

Criner sent a letter via first-class mail inviting homeowners to a seminar about kitchen and bath design. People were told that attendees would receive a free book about K&B design.

4 Advertise

TIME: The first ad ran two months before the seminar; a second ad ran one month before the seminar

COST: $30 per page per month

Criner placed a full-page ad in the neighborhood's 10-page newsletter, "The Smoke Signal." "That's where they see you every month," he says.

He used a general ad with a photograph and copy telling people what his company does and directing them to Criner Remodeling's website. One month before the seminar, he switched out the general ad and used an ad highlighting the upcoming seminar. The new ad had a similar, recognizable layout.

Tip: Many newspapers print in black and white. Make sure your color photography will still reproduce well.

6 Seminar

TIME: One day for the setup and event

COST: $350 for clubhouse rental; $250 for food

Ten days prior, Criner placed signs at the neighborhood's two entrances directing people to the clubhouse where the seminar would be held. The seminar consisted of Criner "doing a 30- to 45-minute stand-up ... about common kitchen and bath design mistakes, about legal issues, contracts, and design ideas," he says. Criner Remodeling provided food and beverages. Although it wasn't required, attendees gave Criner their name, number, and email address. Within a few weeks he had appointments set, and within a month he had garnered some work.

One Look/One Message

Marketing strikes at the heart of your business and brings up questions that dig into who you are and what your company stands for. "A marketing program would be the totality of what you're doing to sell your products and services to your target market. This is 'Big M' marketing," says Dave Alpert, owner of Continuum Marketing, in Great Falls, Va.

A marketing campaign — "little m" marketing — is one component in your overall strategy that draws on the answers to those "Big M" questions. **"Before beginning any campaign, take inventory of all the things that you already have that are visible to consumers, such as your logo, website, brochures, job signs, trucks, and employee clothing,"** suggests John Galbraith, owner of Twin Advertising, in Pittsford, N.Y., whose clients include vendors, manufacturers, and general contractors. "Ask yourself, 'How am I being looked at?' Once you've done that assessment, you can think about a particular campaign."

Taking inventory will help to define your brand — what comes to mind when someone thinks about your company. If you want to be thought of as "professional," look at your inventory list. Are your job signs high-quality and well-designed? Is your website easy to navigate? Are the photographs in brochures and direct-mail pieces crisp and professional?

If you're low on funds, Galbraith suggests finding a local college marketing class to take on your business as a branding project. The cost is zero and you will likely come away not only with ideas but with ready-made mock-ups of materials such as letterhead, logos, brochures, and advertisements. Or, get a marketing major as an intern to help you work on branding.

"Branding and marketing go hand in hand; you want a uniform message and brand standard on everything from the style of fonts you use to colors to spatial relationships," Galbraith says. "You want to have one look, one message."

Match Your Market

"You can do job-site signs, advertisements, search engine optimization," Alpert says. "In a soft market you might want to have the ability to launch a pay-per-click campaign. Consider what will give you the greatest value." In recent years, remodelers have had luck sending out thousands of direct-mail pieces. But they're no longer seeing the same level of returns. **Alpert suggests smaller direct-mail campaigns.** "Sending out 5,000 pieces with the wrong message will be more costly than sending out [far fewer] with the right message," he says.

Getting the right message out means knowing your ideal buyers and understanding how they buy. "Gen Xers, [those born between 1965 and 1980]," says Alpert, "do a lot of research and want you to help them buy. And now baby boomers [those born between 1946 and 1964] have taken on Xers' buying patterns. They do more research. Everyone is more interested in learning to buy than in wanting to be sold." Your approach should match your market. "Be informational if you're targeting these market segments now."

Remember, although a marketing campaign is just one component in your overall marketing plan, it still should reflect your brand attributes and resonate in the same way with consumers. Every campaign should connect somehow to every other campaign. If you have red trucks, make sure you have red job signs and a red logo and red shirts. You want to hear people say, "I see you everywhere."

Develop campaigns as a part of your long-term marketing strategy and they will reverberate even after a job is completed. **"The end of every project is not the end of the process,"** Alpert reminds his clients. **"It's really the beginning of the relationship."**

Stacey Freed is a senior editor at Remodeling, where this article first appeared.

Tools & Information

Inexpensive ways to get address lists for your campaign and to determine whether a neighborhood is right for you:

- **Hanley Wood Market Intelligence** (owned by the same company that publishes *JLC*) has demographic information available that can help you define your target market. go.hw.net/r-rri.
- **InfoUSA** is a mailing list company. infousa.com.
- **Street-level canvassing** can get you homeowner names and addresses. You can either use a local website, as remodeler Robert Criner did, or just walk a neighborhood.

Work the Web

Ways to use the Web to help build your campaign:

- **Blogs:** You, or someone in your office, can write blogs in-house that appear on your website; work with a third-party blogger — preferably someone who writes about your target neighborhood; or get previous clients to post reviews on a local website.
- **Tags:** Start using 2-D tags or QR codes on every marketing piece. Their design can be customized to fit your branding efforts. According to Digital Buzz Blog, "[A]lready in 2011, more than 50% of all 'local' searches are done from a mobile device."

Illustrations: Stanford Kay

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Do Synthetic Underlayments Make for Better Roofs?

While some old pros are sticking with organic felts because they're low-priced and breathable, many are moving to synthetics for greater flexibility

by Michael Chotiner

The last time *JLC* treated the subject of synthetic roofing underlayments in depth (May 2006), author John Nicol acknowledged that synthetics are stronger, lighter, and faster to install than asphalt felts, but asked whether they're worth the extra cost — estimated at about 30 percent at the time. Today, with even more synthetic underlayments on the market and their premium over felt a bit higher, the question is worth revisiting.

My own acquaintance with felt underlayment began more than 40 years ago (at the time 15# felt actually weighed 15 pounds per square), when I went up on the roof of my mother's 1952 cape to find and fix the source of a leak in the garage. I stripped away the asphalt shingles and, voilà, there was a patch of torn, buckled felt near the valley and some rotted plywood sheathing.

I replaced the spongy sheathing, nailed down some new 30# felt, flashed the valley with aluminum coil stock, and the leak was gone. Several years later when the roof was showing its age, I put a new layer of asphalt shingles over the original roof, and the house stayed dry for the 25 remaining years that Mom lived there.

Methodology

Synthetic underlayments weren't available back then, of course, but would I

"We find that synthetics are much easier to use [than felts] and provide much better mid- and long-term protection for the house."

— Lou Hale, general contractor, Massachusetts

have done anything differently if they had been? That's what I wanted to work through as I gathered information on more than 20 underlayments — both synthetic and organic — in preparation for this article. I pored over sell sheets, spec sheets, and installation instructions, and I talked with manufacturers' technical reps along with builders and installers who work with both types of underlayment. In addition to matters of cost, ease of installation, and durability, I found we have to wrestle with another fundamental issue: Is it better for a roofing underlayment to be permeable or impermeable?

The Permeability Debate

One of the most important data points with regard to a roofing underlayment is its permeability rating — that is, its resistance to penetration by moisture in both liquid and vapor forms (see "Vapor Permeability Classifications," page 62). Everybody agrees that impermeability to liquid water is a good thing in an underlayment; it means the roof deck won't get wet, even if wind-driven rain or ice dams force water under the finish roofing, or the weather turns rainy once the underlayment is down but before the finish roofing has been installed.

But impermeability to water vapor might not be such a good thing — at least in certain cases (see "Whatever Happened to 30# Felt?," page 62). Some pros argue that if a roof deck were to get wet due to a leak at a flashed penetration or a tear in a roofing layer, or because of moisture buildup in an unventilated attic, an impermeable underlayment would trap vapor. The potential result: mold, mildew, and rot in the wooden parts of the roof structure.

Most but not all synthetic underlayments are impermeable to both water and vapor. Asphalt felts are semi-permeable — they're pretty good at shedding water, and they're great at letting vapor pass through, particularly when they get wet.

The Case for Synthetic Underlayments

In addition to being impermeable to water, synthetic underlayments are more tear- and puncture-resistant than asphalt felts. Synthetics also resist expansion and contraction with temperature cycling, so they wrinkle and buckle less severely than felts, with less tearing around fasteners. Virtually all synthetics have a UV-resistant coating so they don't degrade with prolonged sunlight exposure. That means that roofs dried-in with synthetic underlayments need not be finished for six to 12 months if they've been fastened with cap nails or cap staples, which are recommended by most manufacturers.

Synthetic underlayments claim significant advantages over felts for installers. Generally, rolls of synthetic material are wider, longer, and lighter than felts. This means easier handling and faster installation. Most claim to have slip-resistant coatings or textures for better traction under wet or dusty conditions. Synthetic materials also remain more flexible in cold weather and roll out without cracking or chatter. This characteristic can lengthen the work season for roofers in colder climates.

And after installation, synthetic underlayments promise better performance than felts. Since they provide an impervious secondary layer of moisture protection, a roof protected with synthetic underlayment isn't likely to leak even if a few shingles crack or blow off. Unlike felts, synthetics don't absorb moisture, so they can't rot or dry out, nor do they support mold and mildew growth.

Not All Synthetic Underlayments Are Created Equal

It's important to note that while the manufacturers of synthetics tout their most desirable general properties — water-shedding ability, strength, light weight, UV resistance, slip-resistance, and such — not all synthetic underlayments are the same. Some manufacturers make more than one synthetic underlayment, recommending each for a different application. For example, while some products are recommended for use with all common roofing types — asphalt shingles, metals, clay tile, slate, and wood shingles and shakes — others are recommended for only one or two applications, say tile and metals.

In many cases, the product brand names aren't terribly descriptive in suggesting specific applications or indicating a product's place in the "good-better-best" hierarchy. For that reason, I've tried to sort out key differences among the synthetic underlayments I found in the market, and grouped products with similar properties in each of three tables displayed throughout this article. (A fourth table listing high-temperature synthetic underlayments is available in the online version of this article.)

Products I've listed as "General-Purpose" (facing page) are the lightest, least-expensive materials, and carry the shortest warranties. They are typically recommended for use with one or more of the common roofing materials. "Premium" products (see table on page 61) are gener-

General-Purpose, Low-Permeability Synthetic Roofing Underlayments[1]

Product Name Manufacturer	Use With[2]	Lbs. per Roll	Width & Coverage (in./sq.)	Fasteners	Max. UV Exp. (days)	Vapor Permeability (perms)	Warranty	Cost per sq. ft.
NovaSeal 1[3] Intertape Polymer Corp. intertapepolymer.com	a, m, s, t, w	25	48/10	Cap nails, cap staples	365	<0.1	Lifetime	$0.14
Pro-Master Roof Shield UDL Berger Building Products bergerbuildingproducts.com	a, m, s, t, w	28	52/10	Cap nails	365	0.05	25	$0.10
Protex SystemComponents Corp. systemcomponents.net/feltex	a, m, s, t	26	48/10	Roofing nails, cap nails	180	<0.1	25	$0.12
RhinoRoof Interweave interwrap.com	a only	25	42/10	Roofing nails, cap nails	30	0.05	10	$0.08
Surround SR Fiberweb surroundtypar.com	a, t, w	26	45 1/4/10	Roofing nails, cap nails	180	0.4	30	$0.09
Titanium UDL 25-plus Interwrap interwrap.com	m shakes & shingles	31	48/10	Roofing nails	180	0.06	25	$0.10
Tri-Flex Xtreme W.R. Grace & Co. graceconstruction.com	a, m, s, t, w	32	40/10	Cap nails, cap staples	180	0.04	20	$0.16
Typar RoofWrap 30 Fiberweb typar.com	a, m, s, t	30	41 1/2/10	Cap nails	180	0.54	20	$0.14

(1) This product list is representative of the category, but not comprehensive. (2) a-asphalt shingles; m-metal; s-slate; t-tile; w-wood
(3) Also sold under the names BP Deckguard Roof Underlayment, SF Roof Underlayment, and GreenGuard.

ally thicker, heavier, and more expensive, and carry longer warranties. While they may be recommended for use with all common roof finishes, in practice they seem to be used most frequently with metal, tile, slate, and heavyweight asphalt shingles.

"Vapor-Permeable" materials (see table on page 61) are unlike the vast majority of synthetic underlayments, which are impermeable. Doug Snyder, a technical representative for VaproShield, which makes SlopeShield (perm rating: 59) recites the mantra of die-hard fans of asphalt felt: "A building's got to breathe!" While the common wisdom holds that impermeable underlayments don't pose a significant risk when placed in a well-ventilated roof design, Snyder asserts that attic ventilation doesn't carry away water vapor. SlopeShield promotes drying by allowing water vapor to escape, Snyder says, and should be used in any application in which the roofing material is fastened to battens or has an air space underneath, such as tile, wood shakes and shingles, and some metals. Like the impermeable synthetics, SlopeShield will protect sheathing from condensation that typically forms beneath metal and tile roofing.

Who's Using Synthetic Underlayments — and Why?

Paul Ecclestone, product manager for Intertape Polymer Corp., which manufactures Nova Seal underlayments and similar synthetics sold under a variety of brand names, says that sales are on an upswing. "We have seen an excellent rebound from the economic downturn and excellent support for our product lines. As contractors become more and more familiar with the benefits of our synthetic roofing underlayment, we're seeing higher adoption rates." Ecclestone also attributes at least part of the sales growth to the recent incidence of destructive hurricanes and other storms. "On weather-damaged homes," he says, "emergency crews can use synthetic underlayments for temporary roofing that'll keep the houses dry until the finish roofing can be put on."

Lou Hale, a general contractor from

General-Purpose Underlayments. These materials are typically recommended for use with one or more of the common roofing types. Generally they are the lightest weight, least expensive products, and carry shorter warranties.

"A majority of my homes are clay tile or slate. We use Grace Ice & Water Shield as the initial underlayment, then apply [a synthetic underlayment] over it. It's bulletproof."

— Allan Edwards, custom-home builder, Houston

western Massachusetts, says his experience supports most manufacturers' claims about the benefits of synthetics. "When my crew and I are drying-in an addition ourselves, we mostly use synthetics because it'll generally be a couple of weeks before our roofer puts the finish on," Hale says. "We find that the synthetics are much easier to use [than felts] and provide much better mid- and long-term protection for the house."

Convenience also plays a part in Hale's decision on which brand to use. "My underlayment choice is usually based on my choice of supplier — it's not worth paying a $20 hot-shot charge to have another supplier bring out a particular brand of underlayment," he says. "We use Grace Tri-Flex 30 or RoofTopGuard II, depending on where the material is coming from. My preferred lumberyard keeps Tri-Flex in stock, so if they are making the drop, that's what we use. But I have also used a good bit of the RoofTopGuard II, and it's just as good a product."

Hale finds that the wider, longer, lighter rolls really do make a difference in the speed of installation. This speed advantage seems to depend, however, on fastening with staples rather than the nails or cap nails most manufacturers recommend. "We frequently use staple hammers or plain old roofing guns. While that may not be a manufacturer-approved method, I can tell you it will hold through a New England summer thunderstorm just fine, and it's at least twice as fast as using a pneumatic cap stapler. You can literally tack a synthetic roll down on one end, have a guy roll out 30 to 40 feet while another guy just walks along the roof and nails it down — even on windy days."

For Hale, tear resistance is also a big advantage, especially on reroofs, where the surface might not be perfectly flat and smooth. With #30 felt, one missed nail during tear off can lead to a hole and a potential leak.

"We recently put this to the test on an 1840s cape we're remodeling," Hale says. "We needed to temporarily dry-in the house over widely spaced sheathing boards that were peppered with jagged nails. We were able to walk up and down that 8-pitch roof without causing a single hole or tear. Thirty-pound felt would've fallen apart under our feet."

When I ask Hale if the labor savings with a synthetic compensate for the higher cost, he says, "The short answer is no, the labor savings are significant but don't equal the increased material cost. However, the peace of mind that comes from all the other benefits, combined with the labor savings, more than justifies the premium for me."

Randy Bush of Great Falls, Mont., uses synthetic underlayment because he installs mainly steel roofs. "One reason for using synthetic is I don't like the black footprints you get from felt when stepping on it, then onto the metal," he says. Another reason is that an impermeable synthetic more effectively protects the roof deck from dripping condensate that tends to form on the underside of metal roofing.

Joe Adams, a Houston builder whose homes have either copper or "comp" (premium asphalt shingle) roofs, tells me, "My roofer prefers a synthetic underlayment — Berger Pro-Master UDL-Plus. He supplements this with Grace Ice & Water Shield [a modified bituminous, self-adhering flashing material] at the valleys and roof-wall intersections."

Allan Edwards, another Houston builder of high-end custom homes, uses synthetic underlayment in an unexpected way. "A majority of my homes are clay tile or slate; a few are metal. We use Grace Ice & Water Shield as the initial underlayment, then apply Titanium UDL-30 Plus over it. It's bulletproof."

When I ask if this isn't overkill, Edwards sends me to his roofer, Robert Coreale, owner of Tile Roofs of Texas, for an explanation. Robert says, "For most roofers, Ice & Water or Titanium only would be okay, but here's why we go that extra step: Ice & Water should not be exposed to UV for extended periods of time, so you need a layer to protect it. You could use #30 felt or any other type of underlayment for this ply, but we use Titanium because it is very durable and easy to walk on — it provides very good traction. The synthetic layer also protects the Ice & Water from

Premium Underlayments (facing page). These materials are generally thicker, heavier, and tend to carry longer warranties. They are also more expensive: The products listed here are almost 50% more expensive on average than the general-purpose materials. Premium underlayments are used most frequently with metal, tile, slate, and heavyweight asphalt shingles.

Vapor-permeable underlayments. These materials are recommended for use on unventilated roofs and with finish roofing materials that are installed with an air space between the roof deck and the underside of the finish roofing, such as wood shingles and shakes, some metals, and tiles.

Premium Synthetic Roofing Underlayments[1]

Product Name Manufacturer	Use With[2]	Lbs. per Roll	Width & Coverage (in./sq.)	Fasteners	Max. UV Exp. (days)	Vapor Permeability (perms)	Warranty	Cost per sq. ft.
Feltex SystemComponents Corp. systemcomponents.net/feltex	a, m, s, t	31	48/10	Roofing nails, cap nails	180	<1	35	$0.13
NovaSeal Generation II[3] Intertape Polymer Corp. intertapepolymer.com	a, m, s, t, w	33	48/10	Per local code	365	<1	Lifetime	$0.24
Pro-Master Roof Shield UDL-Plus Berger Building Products bergerbuildingproducts.com	a, m, s, t, w	30.3	52/10		365	0.05	25	$0.15
RoofTopGuard II Drexel Metals Corp. drexmet.com	All common roofing materials	43	60/10		180	< 0.1	30	$0.19
Sharkskin Comp Kirsch Building Products sharkskin.us	a, m	38	48/10	Roofing nails, cap nails	180	<0.1	50	$0.25
Sharkskin Ultra Kirsch Building Products sharkskin.us	a, m, s, t	45	48/10	Cap nails, cap staples	365	<0.1	50	N/A
Titanium UDL 50 Interwrap interwrap.com	a, m, s, t	48	48/10	Roofing nails	180	0.05	50	$0.17
Titanium UDL 30-plus Interwrap interwrap.com	All materials on sloped roofs	40	48/10	Cap nails, cap staples	180	0.06	30	$0.12
Triflex-30 W.R. Grace & Co. graceconstruction.com	All common roofing materials	28	48/10	Cap nails, cap staples	180	0.05	25	$0.13

(1) This product list is representative of the category, but not comprehensive. (2) a-asphalt shingles; m-metal; s-slate; t-tile; w-wood
(3) Also sold as Xmark, Permafelt, NovaSeal II, WaterBlock RU-200, RoofGuard XB, SF Pro Underlayment.

Vapor-Permeable Synthetic Roofing Underlayments[1]

Product Name Manufacturer	Use With[2]	Lbs. per Roll	Width & Coverage (in./sq.)	Fasteners	Max. UV Exp. (days)	Vapor Permeability (perms)	Warranty	Cost per sq. ft.
Deck-Armor GAF gaf.com	a, m, s, t, w	37	54/10	Cap nails cap staples	180	16	Lifetime	$0.22
SlopeShield VaproShield vaproshield.com	Any roofing with air space underneath	29	59/8	Screws with plastic caps	120	59	20	$0.40

(1) This product list is representative of the category, but not comprehensive. (2) a-asphalt shingles; m-metal; s-slate; t-tile; w-wood

construction traffic. Stucco and brick layers are not easy on the peel-and-stick."

Better or Just Different?

With all of the underlayment products I've studied here, and all the testimony I've reviewed from the pros that use them, I'm convinced that there are enough good alternatives to address virtually any roofing job nicely. I'm also convinced that you've got to understand the issues and goals of any given job to choose an underlayment wisely. One guy wants to deliver a workmanlike job at the lowest price possible and still make a profit; another wants a bulletproof 100-year roof and has a customer willing to pay for it.

I'm convinced that synthetic underlayments are more durable and faster to install than felt, but at publication, #15 felt goes for only about 4½ cents a square foot; #30, about 9 cents. If you're going to cover the felt right away and you can flash vulnerable spots of the roof adequately, why not keep the cost down? On the other hand, even though synthetic materials are more costly, faster installation means lower labor cost, as does the resistance to collateral damage from foot traffic during construction.

About the only claim many manufacturers make about synthetic underlayments that's suspect in my mind is that they're safer underfoot. More than one guy told me a story about expecting to stride up a slope on slip-resistant underlayment only to end up on his butt. The comment in my notes reads, "They're not less slippery; they're just different."

That comment applies to synthetics in many ways. While I probably wouldn't have done anything different when reroofing my mother's house 40 years ago even if I had known about synthetics, I would do it all differently today.

***Michael Chotiner** is a former contractor who has written extensively on building and home-improvement in print and on the Web.*

Whatever Happened to 30# Felt?

Asphalt-impregnated felt — aka tar paper — enjoyed a 100-year run as the preeminent roofing and siding underlayment. First made by soaking rag fibers in tar, the basis later became wood fibers mixed with asbestos and fiberglass for greater strength and economy. In response to oil scarcity in the 1970s, the oil content changed — and so did product names. By shifting the pound symbol, 15# felt became #15 felt, which may actually weigh 7.5 to 12.5 pounds per square; #30 felt can weigh between 16 and 27 pounds per square.

Today, some smart people still prefer asphalt felts to synthetic alternatives. Chad Fabry, moderator of *JLC's* Building Science Forum and owner-operator of Rochester, N.Y.–based StructureSmart, says, "I use #30 felt each time, every time. As far as I'm concerned, there isn't yet a purposefully designed product that sports a variable perm rate and water shedding properties that surpasses the serendipitous invention of felt."

Felt's perm rating varies. Dry, #15 felt is rated at 6 perms, #30 felt at 5 perms. When wet, however, felt's permeability increases to between 20 and 60 perms, according to Martin Holladay of TheEnergyNerd.com. A permeable underlayment may be a good thing, then, for applications such as a roof over an unvented attic or cathedral ceiling, for traditional installations of cedar shake and shingle roofs — or for a leaky roof.

Whether a permeable underlayment offers a benefit for the most common home roof assemblies is questionable, however, according to a white paper sponsored by Owens-Corning, co-authored by Joseph Lstiburek of Building Science Corporation. Its title, "Vapor Permeability Provides No Performance Benefit for Roofing Underlayments in Ventilated Attics," tells the other side of the story. Test results provided in the paper indicate that layers of asphalt shingles built up in a typical installation form an impermeable barrier that won't allow moisture to escape even if the underlayment can breathe. — *M.C.*

Vapor Permeability Classifications

Value	Classification
Less than 0.1 perm	Impermeable
0.1 to 1.0 perm	Semi-impermeable
1.0 to 10 perms	Semi-permeable
Above 10 perms	Permeable

Source: "Insulations, Sheathings and Vapor Retarders" (Research Report 0412), Joseph Lstiburek, Building Science Corporation

Impermeable membranes effectively keep out wind-driven rain and water backed up behind ice dams, but also trap moisture that's trying to escape from unvented attic spaces. Apply semi-permeable underlayments on inadequately vented roofs or provide ventilation before drying-in the roof.

Products

Faux Shakes.

Bellaforté polymer roofing shakes are 12 inches long and come in eight different widths, allowing installers to create a staggered appearance that simulates rough-hewn wood shakes. The material resists water absorption — which eliminates freeze-thaw issues — and can be installed in all weather conditions. Self-aligning tabs ease installation time. A square of shakes (100 pieces) weighs just 190 pounds and costs about $260.

DaVinci Roofscapes, 855/299-5301, davinciroofscapes.com.

Double Duty.

Premium Plus Zero VOC Interior Paint is a self-priming interior coating that combines the primer and finish coat in one product. The 100% acrylic formula is Greenguard-certified, and the odor dissipates quickly after application to lessen lingering paint smells, says the maker. A line of *Low VOC* colorants is available for the paint. Cost is $32 per gallon.

Behr, 877/776-3961, behrpro.com.

Cleanest Woodburner.

The *Lopi Cape Cod Woodstove* is billed as the cleanest-burning large cast-iron stove ever. Its Hybrid-Fyre combustion technology combines a system of internal chambers and baffles with a catalytic combustor that ignites any unburned particles in the exhaust. The result: 80% efficiency and flue emissions of 0.45 grams of particulate per hour. The optional GreenStart igniter will light the fire with the push of a button. The stove costs $3,400.

Travis Industries, 800/654-1177, lopistoves.com.

No More Sonotubes.

Perma-Columns are 10,000-psi precast reinforced concrete posts with ribbed plastic-and-fiberglass pads at one end and galvanized post bases at the other. You install them with 3 to 4 inches of concrete exposed above grade to keep wood posts away from ground moisture. Prices are $46 for a 4x4 40-inch column, $71 for a 6x6 40-inch column, and $80 for a 6x6 60-inch column.

Perma Column, 888/699-8875, permacolumneast.com.

For more information about these products, go to http://jlc.hotims.com.

Products

Heat Trap. Makers of the *York* tub say it will keep bath water warmer in even the coldest of winters. It's made from materials with high insulation properties — finely ground volcanic limestone mixed with high-performance resin — that, in combination, work like the walls of a Thermos to prevent heat loss. That's different from cast iron — which must first absorb the heat before it can retain it — and acrylic, which lacks any practical insulation value. Cost is $2,900.

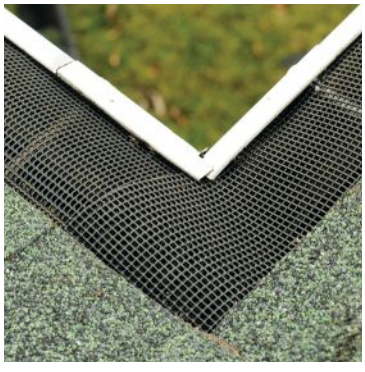
Victoria + Albert, 800/421-7189, vandabaths.com.

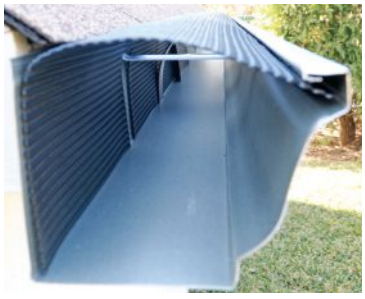
The Sentinel. *Verilock* is a wireless security sensor built into a standard latch. It's available as an add-on to Andersen's E-Series/Eagle windows and sliding doors, and was developed with Honeywell to work with that company's home security systems. The sensor indicates whether the window or door is open, closed, locked, or unlocked; homeowners can check status with a smartphone or tablet. A lithium coin cell battery supplies power. The upcharge is $100 per window and $150 per door.

Eagle Window and Door, 855/324-5314, eaglewindow.com/verilock.

Hybrid Finishes. Atlas Homewares' *Modern Bronze Finishes* is a cross between traditional oil-rubbed bronze and modern graphite grey. The finish is being used on a range of the company's hardware, from thick pulls to small square knobs and circular mini-pulls. Knobs start at $6.10, and pulls range from $6.60 to $33.60.

Atlas Homewares, 800/799-6755, atlashomewares.com.





Tough Mesh. The *SlimGuard Gutter Guard* consists of a high-density polypropylene mesh installed over flexible ABS plastic support struts; it's thin enough that the two legs can be overlapped at corners. The product installs inside the gutter without caulk or screws — all you need is some sharp scissors. Because it takes up virtually no space inside the gutter, it won't slow the flow of water in a heavy downpour. It's available from roofing and siding suppliers for around $2.25 per linear foot.

SlimGuard, 800/796-4476, slimguardusa.com.

For more information about these products, go to http://jlc.hotims.com.

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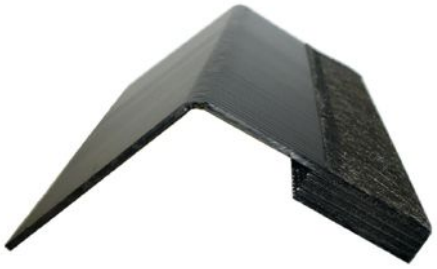
Products

Old Twist, New Finish. Outwater has added a number of new finish options — antique nickel, copper vein, oil rubbed bronze, oil rubbed copper, and satin black — to its *Traditional Staircase Elements.* The powder-coated wrought-iron balusters, newel posts, and other components are available in a broad range of styles. Baluster prices range from $7 to $13 apiece, depending on the pattern and finish.

Outwater Plastics Industries, 800/631-8375, outwater.com.

Thick as Glue. The first thing we noticed about the new water-based *Peel Stop Paint Primer* is how thick it is — three times thicker than a standard primer, according to the maker. You can lay a heavy coat on a vertical surface without any sagging, and smooth over weathered surfaces. As a binding primer, it's supposed to glue down minor peels and other defects (though you still need to scrape and wash the surface). You can top-coat it in two hours and use it under or over any oil- or water-based top coat. It costs around $35 per gallon.

Rust-Oleum, 800/385-8155, rustoleum.com.



Disappearing Ridge. The *SmartRidge* is a ridge vent with a baffle on one side only; if the baffle faces the backyard, the vent won't be visible from the street because it will be hidden by the ridge caps. The company claims that having a single baffle actually increases airflow because negative air pressure created by wind flowing over the ridge pulls air only from inside the attic, and not from the outside through the other baffle. Pricing is $2.50 to $3 per foot or $7.50 to $9 per piece.

DCI Products, 800/622-4455, smartridge.com.

Smoke Blocker. Touch 'n Seal's *FireStop Gun Foam* is the only USA-manufactured one-component foam approved as a through-penetration firestop sealant for commercial and residential applications, says the maker. It's used to fill voids around pipes and conduits. It's also UL-classified for use in common fire penetration joint systems, so it can serve as a fireblock in connecting spaces like the tops and bottoms of studwalls and stair stringers. It bonds to wood, masonry, rigid insulation, metal, plastic, and drywall, and dries red for easy identification as a fire sealant. It costs about $13 per can.

Convenience Products, 800/325-6180, touch-n-seal.com.

For more information about these products, go to http://jlc.hotims.com.

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Toolbits

Gimme a Lift.

Some of us have only a small shop or garage for storing tools, and ladders take up too much valuable wall or floor space. The new *Ladder Lift* helps ease the squeeze by making it relatively painless to store even heavy ladders overhead. It uses a rope-and-pulley system and a fixed hook that mounts on the ceiling. You lift one end of the ladder onto the fixed hook, attach the strap to the other end, and pull on the rope. The lift can handle up to 150 pounds and costs $50.

Racor, 800/783-7725, racorstoragesolutions.com.

Super Stirrer.

The *StirWhip* paint stirrer's "fingers" are much more robust than they look in photos. They're flexible enough to squeeze through the pour spout of a 5-gallon paint can, yet stiff enough to dig up sediment and to mix denser materials like drywall compound. They're easy to clean, too. Though installed to create a 5-inch diameter, they can be cut with scissors or a knife to fit in a small can. They come with an 8- or 18-inch-long rod for $10 and $15.

Prazi USA, 800/262-0211, praziusa.com.

Compact Powerhouse.

People who have tried the new *M12 Fuel* drivers say they pack a lot of power for their size. According to Milwaukee, the tools' brushless motors are more efficient than standard motors, and their "Redlithium" batteries provide up to four times more runtime and 20% more power than standard li-ion batteries. The line consists of a screwdriver, a drill/driver, a hammer drill/driver, and three impact drivers. The 1/4-inch Hex Impact Driver Kit shown costs $170.

Milwaukee Electric Tool Corp., 800/729-3878, milwaukeetool.com/brushless.

Force Multiplier.

Makita's *LXTX2* rotary hammer is an update of the HRH01, except it uses two 18-volt batteries instead of a single 36-volt — which means contractors who own other LXT tools can use their existing batteries and chargers. It delivers twice the drilling speed of 18-volt rotary hammers and can drill three times more holes per charge. A torque-limiting clutch automatically disengages gears if the bit binds, preventing damage. A multi-port charger would be a good addition, but so far the company hasn't announced plans to add one. Cost is $350.

Makita, 800/462-5482, makitausa.com.

For more information about these products, go to http://jlc.hotims.com.

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The 2012 *JLC* editorial index contains listings for feature articles, selected departments, product reviews, tool reviews, news stories, and letters. References are listed by topic rather than by article title. The following codes are used to help you find information:

* — In-depth coverage
L — Letter to the editor
Q — Question and answer
P — Product information

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Makita USA, Inc.	49	makitatools.com/X2	
Mark E Industries	67	markeindustries.com	866-771-9470
Marvin Windows and Doors	11	pros.myMarvin.com/Tools	800-268-7644
Marvin Windows and Doors	55	IntegrityWindows.com/Promo10	
Maze Nails	14	mazenails.com	800-435-5949
Muro North America, Inc.	10	muro.com	800-665-6876
National Nail Corporation	32	camofasteners.com	
Panasonic	9	panasonic.com/ventfans	
Pearl Abrasive Co.	50	pearlabrasive.com	800-969-5561
Porter Cable	1	PorterCable.com	
ProKnee Corporation	79	proknee.com	800-549-5018
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ShurTech Brands, LLC / FrogTape	63	FrogTape.com	877-FROGTAPE
Simpson Strong-Tie	25	strongtie.com/genuine	800-999-5099
Simpson Strong-Tie	Outsert	strongtie.com/genuine	
Softplan Systems, Inc.	67	softplan.com	800-248-0164
Stanley Tools	OBC	stanleytools.com	
Structus Building Technologies	63	hydrotrimcorner.com	888-662-6281
Tapco Solutions by The Tapco Group	28	TapcoSolutions.com	
Titebond	5	titebond.com/PROvantage	800-347-4583
Tjernlund Products, Inc.	79	tjernlund.com	800-255-4208
Trex	16,17	trex.com	
Trim-Tex Drywall Products	50	trim-tex.com	
Velux-America, Inc.	20,21	veluxusa.com/taxcredits	
wedi Corporation	30	wedicorp.com	877-933-WEDI
Western Red Cedar Lumber Association	40	realcedar.org	866-778-9096
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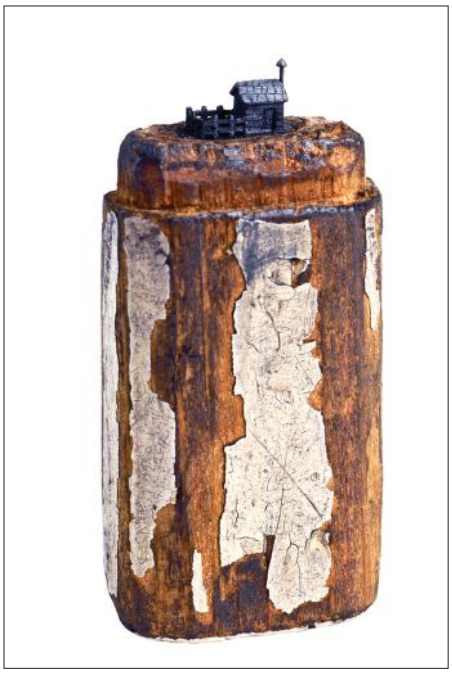
Pencil Sculpture

For more than 25 years, Bridgeport, Conn., carpenter and remodeler Dalton Ghetti has been carving pencil lead into striking miniature sculptures, working mostly with razor blades and sewing needles, which he sometimes modifies on a sharpening stone to form tiny chisels or gouges. The work demands a light touch, a sharp eye, and lots of patience. The graceful one-piece chain pictured below, for example, took Ghetti about two years to complete. "I don't work every day, and I can't carve for more than an hour or an hour and a half at a time," he says. "If I have a little bit of dust on the table at the end of that time and didn't break anything, that was a good day." — *Jon Vara*



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