Composite Decking Update

by Reid Shalvoy

Forget "no maintenance": These products require periodic cleaning and upkeep to prevent mold stains

Growing consumer interest in low-maintenance alternatives to traditional building materials is having a real effect on the residential decking market: By 2011, wood-plastic composites will account for almost a quarter of all residential decking sales, predicts the Freedonia Group, a research firm. That's up from 4 percent in 1996.

As the popularity of composite decking increases, so too will the need for builders and remodelers to familiarize themselves with the category's expanding number of products. Each manufacturer offers a distinct blend of polymers, organic fibers, and additives, meaning that material strength, durability, and resistance to mold and fire vary widely according to brand. Some composites manage to look a lot like real wood, while others don't come close. Some have met code test standards, but most have not. And each product has its own installation guidelines — which tend to be quite a bit more complex than those for traditional wood decking.

Pros & Cons

Manufacturers of composite decking have worked hard to sell homeowners and builders on the long-term advantages of their products. Composites eliminate the expense of regular staining and annual water sealing. They don't check or split like solid lumber, and they promise to outlast even the most rot-resistant of solid sawn species. In addition, many makers use at least some recycled content, whether for the wood fiber, the plastic, or both — an important selling point for some consumers.

Composites have their drawbacks, too. For example, many consumers have complained of a tendency to mildew, especially when the decking is installed in the shade. Manufacturers contend that *any* decking product would mildew in shady conditions — but while that may be true, the problem has been a surprise to homeowners who believe they were promised a product that required no maintenance.

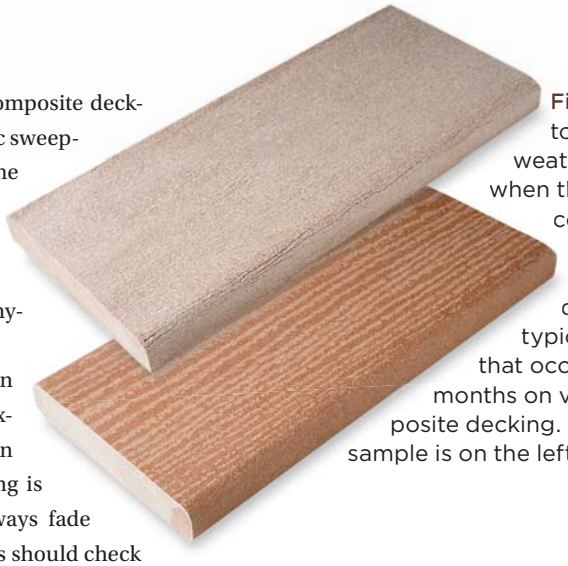

Figure 1. It's best to show clients a weathered sample when they choose a color of composite decking. These Fiberon boards demonstrate the typical weathering that occurs in three to six months on virtually all composite decking. The weathered sample is on the left.

To keep decks looking good, most composite decking manufacturers recommend periodic sweeping and washing with water to keep the surface free of debris and dirt, which can support mold growth. If stains or mold do occur, the companies recommend a deck wash containing sodium hypochlorite and detergent.

In cases where the decking has been left wet and poorly maintained for extended periods, fungal decay has been reported with some composites. Fading is another issue. Composites almost always fade when exposed to sunlight, so customers should check weathered samples when choosing colors. Weathering is usually complete in three to six months, depending on exposure (**see Figure 1**).

The Chemistry

Most wood-plastic composite decking products are made with polyethylene, commonly used for plastic bags and bottles and other consumer products. A smaller number of manufacturers use polypropylene, which is a much harder plastic, or polyvinyl chloride (PVC), also known as vinyl.

Figure 2. CorrectPorch solid T&G planks are intended for use on covered porches with sloped floors. A built-in spacer "bead" creates a small gap between planks that allows for drainage and thermal expansion. The composite can be painted or left unfinished.

While different plastics have different mechanical qualities, a decking product can't be evaluated solely by the polymer used, since the manufacturer can manipulate the mechanical properties. As Robert Tichy, research engineer at Washington State University, explains, "With the appropriate additives, you could make any polymer perform the way you want. It's just a question of cost."

Adding wood fiber to the composite offers several benefits. Besides being cheaper than plastic, wood tends to outperform plastic in strength, rigidity, and flammability tests. Wood experiences less thermal expansion than plastic and usually weighs less. The wood fiber also helps manufacturers more closely approximate the look of traditional wood decking. On the downside, the presence of wood fiber makes the material more porous and vulnerable to stains, and introduces the risk of mold and decay problems.

Chemical additives like flame retardants and UV stabilizers can also be mixed into the formula, as can antimicrobial chemicals intended to fight mold and mildew. Each additive increases the production cost.

Solid Composites

Of all the composites on the market, solid products like Trex most closely resemble wood decking in size and thickness. But as anyone who has handled Trex knows, solid composites lack the stiffness of their sawn-lumber counterparts, typically requiring joist spacing no greater than 16 inches on-center. Diagonal and commercial applications are usually limited to 12-inch spacing.

On the other hand, the material's flexibility does offer

PRODUCT OPTIONS

CorrectDeck CX

According to the maker, CorrectDeck's blend of 60 percent recovered hardwood fiber and 40 percent polypropylene (part reclaimed) gives the material unusual rigidity. A solid layer of polypropylene encases the exposed wood fibers on the top and sides of each board, providing extra resistance to fading, staining, and water absorption. The surface layer includes UV inhibitors and an antimicrobial agent that resists mold and mildew growth. CorrectDeck has a wood-grain texture and comes in three wood tones plus tan, sage, and gray. Matching railing and trim boards are available as well.

Correct Building Products, 877/332-5877, correctdeck.com.

CrossTimbers

Hollow planks make CrossTimbers decking 30 percent lighter than solid composites. The product's hollow-core cross-section is engineered for stiffness, giving the 5/4x6 Professional series an allowable span of 24 inches. (The lighter 1x4 Classic line spans 16 inches.) Constructed of polypropylene and nonwood organic material, the decking can be either predrilled and screwed or installed with hidden clips that lock into the grooved sides. Matching L-trim serves as an end cap; matching fascia and railings are available. The fire-resistant version of the Professional decking meets the requirements of the California fire code.

GAF-Elk, 866/322-7452, gaf.com.

Fiberon

The polyethylene-wood composite used for Fiberon Professional decking contains 80 percent recycled and reclaimed materials. The product comes in several colors and wood tones with an embossed wood grain on both sides and a 5/4x6 profile. Only one fastener is needed at each joist (two at ends), a feature the manufacturer says speeds installation. The company also sells matching railings and accessories.

Fiber Composites, 800/573-8841, fiberondecking.com.

advantages: Because it can be bent more easily than traditional lumber, curves and round sections are easier to incorporate.

Porch flooring. While most solid composites mimic square-edged deck boards, one exception is a solid tongue-and-groove porch flooring product called CorrectPorch (formerly sold as Tendura), made by Correct Building Products. Composed of a polypropylene-hardwood composite similar to the one used in the company's decking products, CorrectPorch planks have a 3-inch coverage and are butted like traditional solid-sawn porch flooring (**Figure 2, page 2**). They come predrilled 16 inches on-center and have a built-in spacer "bead" that creates a small gap between boards. The spacer was added in response to thermal-expansion problems that plagued earlier versions of the product (a thermal expansion chart can be found on the product Web site, correctporch.com).

For warranty protection, the flooring must have a roof above, be pitched 1/4 inch per foot away from the house, and be well-ventilated underneath to prevent heat buildup. It can be left natural or primed and painted.

Hollow Composites

Though generally lighter than their solid counterparts, hollow composites are engineered to be stiffer, which allows for wider on-center spacing — typically 20 to 24 inches for residential applications and 16 inches for commercial work.

Hollow decking materials can't bend the way the solid composites can, however, and they usually require wood skirting or proprietary trim pieces to hide the cut ends of boards (**Figure 3, page 4**). As a rule, hollow boards don't expand and contract as much as solid composites, but most manufacturers still recommend end-gapping to allow for thermal expansion.

One benefit to these products is that their hollow profile offers a convenient space for running wires and cables for lighting, electrical devices, and speakers.

Some hollow products are tongue-and-groove; these are typically installed with a slight gap about the thickness of a credit card, to allow for expansion. Hollow T&G products may have weep holes or fit loosely enough to allow water to drain through the decking and prevent surface ponding. Even so, sloping the decking surface is also recommended — or sometimes required.

Figure 3. Hollow decking products tend to be lighter and stiffer than solid composites, allowing for wider spacing. For example, CrossTimbers 5/4x6 radius-edge decking can span 24 inches in residential installations. Installers generally use skirting or trim pieces to hide the cut ends.

The Wood Look Sells

How realistically a synthetic product mimics wood decking is a key issue for many homeowners. Jack Hanson, president of Woodpile Construction in Meridian, Idaho, tells his clients, "There's nothing more beautiful than a wooden deck — for the first six months. Then it's a maintenance issue from there on out." Hanson believes that composite products hold up much better than traditional wood decking, though he concedes that occasionally a composite deck plank will fade differently from the rest of the batch.

George Drummond, owner of Casa Deck of Virginia Beach, Va., says that products with deeply embossed wood grains or finishes that emulate the look of tropical hardwoods are the most popular with his customers. But finding a deck board that will continue to look good for many years can be tricky, he says. "A lot of the exotic-style deck boards have a sheen on the surface that scratches easily," he notes. "We install them using drop cloths to protect the surface from our tools, but as soon as the homeowner drags a chair across the deck, there's a problem."

Kim Katwijk, a deck builder from Olympia, Wash., set up an experiment in which nearly 600 customers were asked to rate nine different products. His findings mirrored Drummond's experience: The most popular boards were those with a deep embossed wood grain that approximated the look of a traditional wood plank — products like CrossTimbers, Tamko's EverGrain line, and TimberTech.

Code Approval

With any decking product, there's more to consider than performance and good looks. Frank Woeste, professor

PRODUCT OPTIONS

GeoDeck

This hollow composite is made from partly recycled polyethylene and a combination of wood fiber and minerals that reportedly reduces fading. It comes in three profiles: 5/4x6 T&G (for covered areas), 5/4x6 square-edge, and 2x8 heavy-duty. All are sold in cedar, mahogany, and driftwood colors.

Square-edge GeoDeck is surface-nailed or screwed. T&G installs with concealed trim-head screws or ring-shank siding nails and must be sloped and gapped for drainage and expansion; it also needs to be well-ventilated underneath. The maker offers a matching line of end caps, fascia boards, risers, and railing systems.

LDI Composites, 877/804-0137, geodeck.com.

MoistureShield

Made from 90 percent recycled material — a 50-50 blend of wood fiber and polyethylene — MoistureShield meets the LEED environmental standard for residential decking. According to the manufacturer, it can withstand high moisture conditions, including contact with the ground. It comes in 5/4x6 and 2x6 sizes with a ribbed bottom for extra rigidity and ventilation over joists, and is sold in seven colors, all with a deeply embossed wood-grain finish. Typical installation is with stainless steel trim-head screws, two at each end and one or two at each joist; grooved edges for hidden fasteners are available by special order. The company offers a full line of matching trim and railings.

Advanced Environmental Recycling Technologies, 866/729-2378, moistureshield.com.

Rhino Deck

The wood-polyethylene composite used for Rhino Deck products contains 100 percent recycled and reclaimed wood and plastic. Additives resist mold growth. The decking is offered in 5/4x6, 2x4, and 2x6 dimensions in several embossed wood-grain finishes. The 5/4x6 planks come square-edged or grooved with companion hidden fasteners. The maker sells matching fascia boards, bendable trim, and railings.

Rhino Deck, 800/535-4838, rhinodeck.com.

PRODUCT OPTIONS

Tamko

Both Tamko decking lines are made of a mix of wood fiber and polyethylene, but the amount of recycled content differs: 100 percent in the Elements series and up to 70 percent in the premium EverGrain line. Elements planks are extruded with a wood-grain surface and come in three colors; EverGrain boards are compression-molded for a deeply embossed wood texture and come in seven colors. Matching extruded skirting is available. Both types of decking are sold in 1x4, 1x6, 2x4, and 2x6 dimensions and install with decking screws or hidden fasteners (not supplied).

Tamko, 800/641-4691, tamko.com.

TimberTech

Only reclaimed wood is used in TimberTech polyethylene-wood composite decking, says the company. The product is offered in a variety of profiles and finishes, including 1 1/2x6 T&G hollow planks (Floorizon) and 5/4x6 solid boards (Earthwood and TwinFinish) with optional grooved sides to accept hidden fasteners. Earthwood comes in tropical hardwood colors; TwinFinish planks have an embossed wood grain on one side and a brushed finish on the other. T&G planks are designed for concealed screws and have weep holes for drainage. Solid planks can be installed with surface fasteners or with a manufacturer-supplied concealed clip. Matching trim pieces are available.

TimberTech, 800/307-7780, timbertech.com.

Trex

The plastic in Trex — the original recycled-content composite lumber — is about 50 percent recycled or reclaimed. (Seven out of 10 recycled grocery bags in the U.S. end up in Trex, says the maker.) The wood content also is 50 percent reclaimed, from sources like sawdust and wood pallets. Trex decking comes in a range of colors and textures in 5/4x6 and 2x6 planks, most of which are available grooved for the company's hidden fastener clips. Among the more recent introductions are Trex Origins, a bendable plank for curved installations, and Trex Accents Fire Defense, which has a Class B fire rating and exceeds California's fire regulations.

Trex, 800/289-8739, trex.com.

emeritus of wood science at Virginia Tech, says, "It appears that less than half of all composite and plastic decking manufacturers have a code report."

For a plastic or wood-plastic composite decking product to be approved under the IRC, it must have an ICC Evaluation Service (ICC-ES) report indicating that it has passed a series of tests outlined in ICC-ES document AC 174, which is based directly on ASTM standard D 7032. The standard addresses span, fastener holding ability, bending strength, elasticity, UV and freeze-thaw resistance, fire performance, termite resistance, and the effects of temperature, moisture, and fungal decay.

You can find out if a product is code listed by asking the manufacturer or checking on the ICC-ES Web site (icc-es.org). There's also a list of code-approved composite decking products at 10klakes.org (click on "Composite Decking updated"), the Web site of a Minnesota chapter of the International Code Council. Under the 2007 IRC update, which references ASTM D 7032, all composite decking manufacturers must include their code listing on their product packaging. As this version of the IRC becomes more widely adopted, finding out whether a product is listed should get easier.

Flammability

In areas where wildfires are an issue — Southern California, for instance — additional fire code regulations may apply.

Nearly all composite decking products have fire testing data available from the manufacturer. The most prevalent data is the flame-spread index (ASTM E84), a numerical scale from 0 to 200, with 0 being the best possible score. A Class A product has a flame-spread index between 0 and 25, Class B between 26 and 75, and Class C between 76 and 200.

Heat-release rate. Another good measure of flammability is a building product's heat-release rate: The higher the rate, the greater the intensity of fire the product will produce if ignited. "Without copious amounts of flame retardants, construction plastics have heat-release rates much higher than wood," says Vytenis Babrauskas, author of the *Ignition Handbook* (Fire Science Publishers, 2003). "Though it is possible to add enough flame retardants so that this behavior is controlled, the majority of manufacturers do not do that."

The Cellular PVC Alternative

Cellular PVC decking has become the fastest growing segment of the alternative decking market, thanks mostly to claims by manufacturers that it needs less maintenance than wood-plastic composites. Industry leaders Azek, Fiber Composites, TimberTech, Trex, and Veka have all recently added cellular PVC decking to their product lines. Touting its low-maintenance appeal, TimberTech named its product XLM for "extreme low maintenance."

Cellular PVC — essentially the same material used in Azek's popular exterior trim boards and moldings — has a weight and workability similar to that of pine and supposedly resists fading, staining, and scratching better than composites. Makers say that because it has a hard outer layer of PVC or acrylic and no wood content, cellular PVC doesn't absorb stains and won't support the growth of mold or decay fungi. (That doesn't mean, however, that a pile of wet leaves left sitting on a deck over the winter won't leave surface stains — on this or any other material.)

The product's lack of wood content is also one of its drawbacks: It looks more like plastic than most wood-plastic composites do. Manufacturers are trying to address this with less-shiny matte finishes, more realistic wood colors and textures, and darker hues. For example, Fiber Composites' Sanctuary line and TimberTech's XLM planks both come in colors that mimic ipe and driftwood. The end result is a fairly genuine-looking board.

While all-PVC decking typically has a higher rate of thermal expansion than wood-plastic composites, manufacturers control movement by including inorganic fillers or additives (or in the case of Azek Deck, a flax product made from agricultural waste). End-to-end spacing is comparable to that of composites. Though not as strong and stiff as most composites, cellular PVC is generally rated for a 16-inch span under normal residential loads. And despite its mainly plastic content, some cellular PVC decking products have achieved a Class A flame-spread rating and have been approved by the state of California and San Diego County for new construction in areas prone to wildfires.

With a price point as much as 20 percent higher than that of wood-plastic composites, cellular PVC decking will appeal primarily to customers whose top priority is low maintenance. It's particularly well-suited to poolside, beachfront, and similar high-moisture environments.

Several manufacturers have introduced cellular PVC decking. Shown here are TimberTech's XLM (top), Fiber Composites' Sanctuary (the two center boards), and Azek Deck (the curved board at bottom).

California fire codes. As of January 1, 2008, the California Building Code has required all newly constructed decks to meet a stringent fire-performance standard called State Fire Marshal (SFM) standard 12-7A-4.

"To be code approved," says Stephen Quarles, a scientist at the University of California, Berkeley, "the evidence of flaming or glowing must stop and the structure must still be intact after 40 minutes with the burner off. If the product has a Class C flame spread, then the walls must be covered with noncombustible materials like fiber cement or traditional three-coat stucco."

Manufacturers must submit test data to the California State Fire Marshal to be eligible for code approval. You can find a list of products that pass 12-7A-4 at jlconline.com/firetested. If a product you want to use isn't listed, you must present the manufacturer's fire-performance documentation to the authority with jurisdiction for approval.

***Reid Shalvoy** is a freelance writer based in Burlington, Vt.*