Synthetic Decking Roundup

by Paul DeGroot

WPC, capstock, cellular PVC — what does it all mean to the deck builder?

Recently, one of my deck clients showed me some samples from a local decking supplier. There were a couple of composites, a new-generation capped composite, and some ipe and tigerwood. When I asked which she thought were the prettiest, she quickly pointed to the wood samples. When I asked her opinion of the capped composite, she said, "It looks like it's got shiny paint on it." Citing the benefits of the capping had little effect on her, so it seems that the quest for the perfect substitute for wood continues.

Manufacturers have made great efforts to earn top scores in looks while producing durable planks that will last decades with few signs of age. Early synthetics fell short of these goals. Some bore little resemblance to real wood; some faded and stained; some fell apart. While today's synthetics are vastly superior to their predecessors, comparing synthetic decking products can make your head swim. It would be convenient if all synthetic decking products were created equal and the only variable was looks. Then making a recommendation would be a cinch: Just hold a beauty contest and install the winner. But synthetics are like restaurants: Each has its own guarded recipes and a unique décor.

Recipes for Synthetic Decking

Although a few nonwood deck products contain little or no plastic — such as aluminum deck systems, stone deck tiles, and Rumber boards (made of rubber from recycled tires) — almost all formulas for synthetic decking are rich with polyethylene (HDPE or LDPE) or PVC (polyvinyl chloride).

In the past, some North American composite makers used polyurethane, polypropylene, or PVC as their plastic. Now, they mix polyethylene with reinforcing ingredients such as wood flour, ground rice hulls, fibers, or minerals, as well as some chemical additives.

Battling the composites for market share are all-plastic decking products extruded from PVC in either a

foamed structure known as "cellular" or a nonfoamed, noncellular structure that is confusingly referred to as "solid PVC," "hollow PVC," or just "vinyl decking." Cellular PVC is the relative newcomer in the all-plastic sector, outselling vinyl decking ancestors by providing the woodlike sound and appearance that homeowners desire and the workability of wood that installers appreciate. (Eon, an all-plastic decking made from polystyrene by Ontario's Gracious Living Corp., once competed in the U.S. but now is marketed solely in Canada.)

Except for EverGrain, which is made using compression molding, each deck product mentioned in this article is made by forcing a hot mixture of materials through a heated die that forms the decking's shape. Mono-extrusion, the process used for the early generations of WPCs, is still used today. In mono-extrusion, the raw mixture forms a single layer of material after passing through the die, with the mix of components evenly distributed throughout the entire cross section of the board. The uniform consistency of the composite material is evident when you look at the end of a sample.

Figure 1. Many composite decking boards have a grain pattern on both sides so they are reversible.

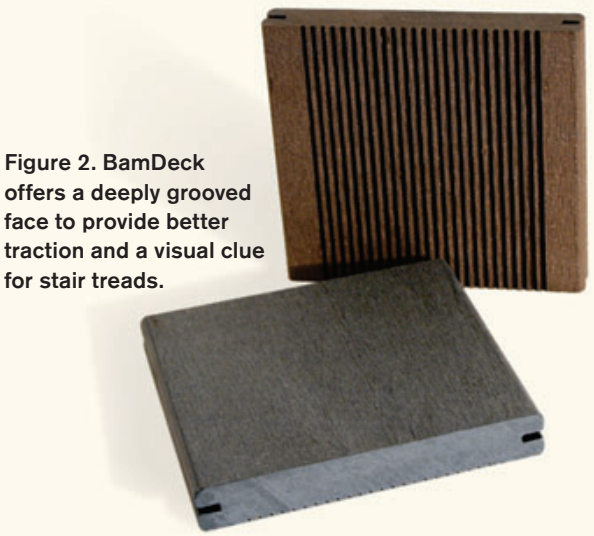

Figure 2. BamDeck offers a deeply grooved face to provide better traction and a visual clue for stair treads.

Mono-extrusion is used for some cellular PVC deck boards as well. The lightweight core is a tightly-packed structure of miniscule bubbles locked into the cured PVC foam. There are two different methods of foaming: free foam and Celuka. The Celuka process provides a harder outer skin than free foaming. As Shane O'Neill with Compositology puts it: "Free-foaming does form a skin, just not a thick, hardened armor exterior. There are pros and cons associated with Celuka. While it is stronger and tougher, it may be susceptible to chipping or fastener surface cracks, because the outside is so tough and rigid while the core is softer."

Co-extrusion is a dual-layer extruding process that enables an outer layer called a capstock to be fused to an inner substrate under heat and pressure. On composites, the capstock is a chemical mixture engineered to keep the core from absorbing moisture while also boosting stain, mildew, scratch, and fade resistance. It also allows for increased color choices, including variegated tones and shading. With PVC decking, the capstock layer is primarily used to impart multishaded and darker colors, which are difficult to deliver with mono-extrusion.

The Composite Players

Whether they co-extrude with a capstock or not, composite makers distinguish themselves from the rest of the pack in a variety of ways. Tamko, maker of EverGrain, applies one of the deepest wood-grain textures in the industry. Accents, the starter composite in the Trex family, also has a grain pattern, of prominent repeating cathedral arches ("plain-sawn" or "flat-grained" in the wood world), on one side.

Some makers put a wood-grain texture on both sides of the boards so they are reversible (**Figure 1**). A.E.R.T.'s MoistureShield wood-plastic-composite deck boards get a wood-grain pattern on both sides during the extrusion process. The same is true for CertainTeed's EverNew 20 composite and Fiberon's Professional Decking — both are made by Fiberon and offered as the least expensive composite in each company's lineup.

Other boards are reversible but have a different texture on each side. TimberTech's TwinFinish Plank has a "vertigrain" wood pattern with long, wavy grains embossed on its walking side and a "serrated" texture, akin to extra-narrow wale corduroy fabric, on the flip side for use on benches, flower boxes, and other deck accents. UltraDeck Rustic by Midwest Manufacturing has a "plowed" side (with a finely-grooved texture like TimberTech's "serrated" finish) and a wood-grained side. Unlike most composites, all three lines from Midwest Manufacturing are extruded with hollow profiles,

saving material. Internal ribs between the cores, acting like the flanges of steel beams, add strength. Intrepid, the entry-level composite in the Latitudes lineup offered by Universal Forest Products, comes in four colors and has wood-graining on one side and a subtle brushed texture on the other.

Cali Bamboo's BamDeck composite planks are also reversible, with one side having a very fine linear texture similar to the grain of brushed metal, while the other side is deeply grooved for extra traction and visual distinction. This can be a safety feature for steps, and a fun feature for creating a different look (**Figure 2, page 2**). Cali Bamboo is the only maker using bamboo fibers and is one of the few that does not try to make its products look like wood. With slotted edges, each plank is installed with hidden fasteners, an option with all composites.

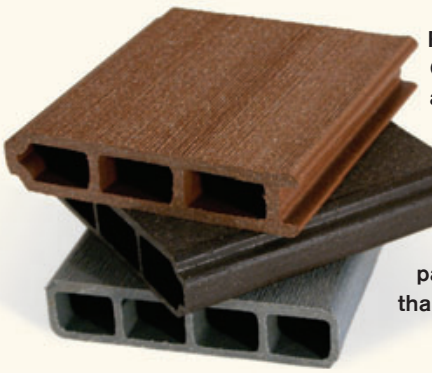

Figure 3. GeoDeck is a rare hollow composite decking, and it uses rice hulls and waste paper fiber rather than wood flour.

Figure 4. NyloBoard decking is a composite of recycled carpet fiber and plastic resin.

Figure 5. Some synthetic decking, such as CertainTeed's EverNew, makes no attempt to mimic wood.

Wisconsin's Green Bay Decking is one of several composite makers that eschew wood flour because of its water-absorption properties; instead it mixes ground rice hulls and processed paper sludge with virgin HDPE to make GeoDeck planks (**Figure 3**). GeoDeck is a rare example of an extruded composite with a hollow core. Matching perimeter strips are used at deck edges to hide the open cores from view. Terratec Naturals by McFarland Cascade is another product made with ground rice hulls. The high silica content of the hulls imparts natural stain and moisture resistance to the decking, according to the manufacturer.

Natures Composites takes a different route, relying on wheat fibers in its TerraDeck composite recipe. Based in Torrington, Wyo., Natures Composites takes advantage of the local abundance of straw, a byproduct of harvesting wheat. According to Kim Boos, the national sales and marketing manager for the company, wheat-straw fiber is stronger than wood cellulose, absorbs less water, and contains no proteins or starches, which can act as a food source for mold.

Other composites touting no wood ingredients are Bear Board, EnduraBoard, and NyloDeck. The first, by Engineered Plastic Systems, is made from at least 50 percent recycled HDPE and reinforced with a secret blend of minerals (essentially pulverized rock, according to Rob Stevenson of the company). The manufacturer claims that minerals in Bear Board and its twin product Lumberock add strength, increase durability, and decrease expansion and contraction. Crawford Industries' EnduraBoard has a similar composition: mostly recycled HDPE plus about 40 percent minerals. NyloDeck, by Georgia-based Nyloboard, distinguishes itself from other composites by using 100 percent post-consumer recycled nylon carpet fibers mixed with a proprietary resin (**Figure 4**).

Is Vinyl Final?

Solid (noncellular) PVC decking was introduced in the late 1980s following the introduction of vinyl fencing and railings. Unlike cellular PVC, solid-vinyl decking is extruded in hollow shapes.

CertainTeed's mono-extruded EverNew Vinyl is said to be slip resistant, using parallel textured ridges across a $5\frac{1}{2}$-inch-wide plank and making no attempt to mimic a wood-grain surface (**Figure 5**). Hollow in cross section like all noncellular-PVC planks, the thick-walled vinyl is easy to clean, cool to touch, and impervious to water, CertainTeed claims. Colors are limited to white, tan, gray, and almond.

L.B. Plastics makes a similar vinyl decking called Uni Deck that is 12 inches wide and comes in four light-toned colors with two surface textures. The co-extruded 6-inch SheerGrain PVC plank from L.B. Plastics comes in two colors with variable shading and streaking in the capstock.

Presidio Deck and Dock vinyl decking by Westech Building Products comes in five colors and is 12 inches wide with a deep groove down the middle on one side. The planks are reversible so that the look of 6-inch boards is an option. The decking incorporates a flange system that hides the fasteners, as do competitors.

Royal Building Product's Deck Lok is also reversible. The 5 1/2-inch-wide plank has a light gray color on one side and a tan color on the other, with grain patterns on both. Royal makes its heftier vinyl product, Brock Deck, in white, tan, or gray and offers two nonslip textures.

Figure 6. Genova Products offers a solid-vinyl decking with variegated coloring.

Figure 7. Azek and Gossen both offer extensive color options in their cellular PVC products.

Genovations from Genova Products is another solid-PVC option. Its capstock comes in three brown-tan colors featuring tonal variation and excellent grain embossing to simulate natural wood. In addition to the variegated colors, Genovations has four solid-color choices with realistic wood-graining (**Figure 6**). All planks are 5 1/2 inches wide and either 1 inch or 1 1/2 inches high, with a complete trim package, including end pieces to conceal the hollow cores at deck edges.

At the Core, Cellular PVCs Are All Similar

I think it's harder for cellular-PVC manufacturers to differentiate their products from those of other cellular extruders because foamed PVC is virtually the only ingredient outside of a small percentage of special additives. They've all adopted the familiar 1-inch-by-5 1/2-inch board size as their mainstay, along with the option of hidden-fastener installation. For consumers, this essentially leaves color and texture as the only variables.

Royal Building Product's Novation cellular PVC, soon to be known as Royal Decking, comes in four solid colors with a realistic grain pattern that looks slightly darker than the rest of the surface. Ditto for both Guardian Industries' cellular product — Guardeck Elite — which comes in four solid colors, and Escapes by Trex, which is offered in two solid colors.

Azek Deck, by Azek Building Products, makes its mark by providing an industry-leading 13 standard colors, including five with variegated tones that resemble the grain and colors of natural woods (**Figure 7**). Not to be outdone, Gossen Corp.'s family of WeatherReady cellular decking comes in 10 colors in three different lines, including Passport, which sports four multishaded natural wood colors. Solstice planks by Deceuninck North America also come in four dark, variegated colors, with deep grain embossing, plus four solid colors with less dramatic grain texture. Made in both grooved and nongrooved boards, the latter can be ordered dual-sided — each side is grained but has a different color (combinations are limited to certain pairs).

Cevn decking by Inteplast Group is dual-sided as well, with six colors in three pairs of combinations, each color wrapping around to the middle of the board edges. Two of the colors are extruded with varying tones down the board lengths. Single-color boards can be ordered for steps and other places where board edges need to show but one color.

Another cellular-PVC product with grain texture on both sides of its boards is Endeck by Enduris, offered in four solid colors. Likewise, Tuf board Deck by Inteplast Group, is wood-grained on both sides and comes in seven solid colors. It markets the look of oak, each plank bearing a grain pattern much like that of a plain-sawn oak board.

Figure 8. Fiberon and TimberTech go to great lengths to create realistic wood graining.

Figure 9. Capstock decking is extruded with a layer of more-durable solid plastic on the outside.

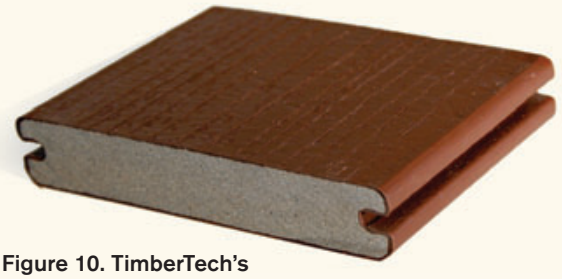

Figure 10. TimberTech's Earthwood Evolutions is entirely wrapped in capstock – even inside the fastener groove.

TimberTech's XLM decking comes in three solid colors and four with varying tones and streaks for a pleasing multi-shaded appearance. TimberTech's grain texture is subtle but convincing, with just small areas of nontextured surface between many indentations that mimic the open pores of a wood like oak or ash (**Figure 8**).

In contrast, Fiberon Outdoor Flooring has deeper grain embossing and more smooth space between grain depressions so the pattern is noticeable from all angles. Color choices include two variegated wood tones and three solids. CertainTeed's EverNew LT line is nearly identical to Fiberon's decking, the exceptions being one additional solid color choice and a surface sheen that reflects slightly less light.

Vekadeck Pro by Veka Innovations comes in six solid colors and is the only cellular PVC decking I came across with subtle crowns in its planks to promote better drainage.

To Cap or Not To Cap

Just like primer and paint make wood last longer, capstocks are said to enable synthetic decking to better ward off moisture, mildew, stains, scratches, and UV degradation. Almost all composite manufacturers have introduced a line of capped decking (**Figure 9**). For example, Rhino Deck claims that the composition of the capstock in its Armadillo line "provides better control over pigmentation, resulting in a denser, richer color, more variation, and a more realistic look."

Capstocks are bonded to the decking substrate during co-extrusion. Because this process is relatively new for composites, however, some in the industry doubt the technology is perfected. Others are convinced their products are so good that capping is not necessary. Advanced Environmental Recycling Technologies' Brent Gwatney, vice president of sales and marketing, has this to say: "We've chosen to not follow suit because we are not convinced capstock is the future of composite decking. We haven't had the issues other manufacturers have encountered due to their boards absorbing moisture, and therefore don't believe that a cap is necessary for our decking to maintain its durability, looks or lifespan." Lanny Jass, president of Green Bay Decking, when asked if his company was planning to release a capped composite, responded more succinctly: "We're proud of the fact that we don't have to release anything new."

Some capstock composite decking is capped on all four sides while others are not. Fiberon's top composite line, Horizon, is fully capped and wood-grain embossed on both sides. Its less expensive Pro-Tect line (also sold by Home Depot under the name ArmorGuard by Veranda) is capped only on the top and edges, leaving the bottom side with a fluted profile to save material. When boards are ordered with grooved edges for hidden fasteners, the groove is cut after

Figure 11. Trex caps only three sides of its boards, claiming that leaving the bottom uncapped allows the boards to "breathe."

Figure 12. Using a thicker capstock allows Trex's premium Transcend line to be deeply embossed.

Figure 13. MoistureShield is the only WPC whose warranty allows it to be installed in ground contact.

extrusion, leaving the groove interiors without capstock.

In contrast, TimberTech fully protects the insides of the grooves on its Earthwood Evolutions decking (**Figure 10, page 5**). Rob Foster with Strata-G Communications says TimberTech is the only maker to encapsulate all sides of its boards including the grooves.

Trex caps just the edges and top sides of its Enhance decking and premium Transcend line (**Figure 11**). When boards are grooved, the capstock extends down into just the top portion of the grooves. Trex believes that capping the grooves adds no inherent benefit to the consumer. Leaving the bottoms of its boards uncapped "allows the underside of each board to breathe, making it possible for moisture to escape. The three-sided shell consequently offers better adhesion than a fully encapsulated board and ensures lifelong endurance," says Adam Zambanini, vice president of marketing for Trex. Guardian Industries also leaves the bottoms of its Guardeck Prestige decking uncapped. It offers four standard colors and a whopping 23 optional capstock colors with its Rembrandt Signature Series.

Co-extrusion technology gives manufacturers the ability to add new colors and woodlike tonal variations in the capstock layer. Not that variegated color isn't done with uncapped composites: MoistureShield sports streaks and shading in four of its eight colors. But closely impersonating the look of a tropical hardwood, for example, is a tall order for mono-extruded composites. Capstocks make that mountain easier to climb; many of their multishaded colors are quite stunning. Further, a heavy capstock layer enables deeper texturing for some. The prominent wood-grain surface on Trex's Transcend line is made possible by an extra-thick capstock (**Figure 12**).

PVC decking makers use capstocks for the same reasons that composite makers do: added protection from the elements and added beauty. Co-extrusion is the reason that darker colors and tonal variations are now possible in PVC decking. Prior to the introduction of this technology, lighter colors were the rule due to limitations in the mono-extrusion PVC technology. Titanium dioxide, a white pigment, is the main UV-inhibitor in mono-extruded products. Darker colors are too difficult to achieve while keeping enough titanium dioxide near the surface where it is most needed to combat fading. By co-extruding a surface layer, rich multitoned colors with variation from board to board are possible, rivaling the impressive looks of capped composites.

Ground and Water Contact

One measure of a deck board's toughness against moisture is whether or not it can be installed in contact with the ground or water. Admittedly, this seems counter to best practices and

Any Decking Can Be Damaged

Builders and homeowners need to read the installation and care/cleaning guides very carefully to determine which substances and items can mar or stain the finish of their synthetic deck, particularly a PVC deck. Below are some items that may be incompatible.

- sunscreen lotions and sprays, insect repellents containing DEET
- children's bubble-blowing solution
- gasoline and other petroleum derivatives
- PVC glue, caulk, and other adhesives
- paint removers, paint thinners, and other solvents
- charcoal lighter fluid
- snapped chalk lines during construction
- mortar, concrete, stucco, and other masonry and cement dust
- abrasive cleansers and scouring pads
- citrus-based cleaning liquids
- garden hoses and vinyl flower pots left for extended time periods
- rubber-backed rugs or mats
- vinyl tarps, kiddie pools or pool toys, air mattresses

Obviously, the sooner spills are cleaned, the better; the manufacturer's instructions should be consulted on how to clean them. Most allow pressure-washing with a wide fan tip, provided it's done gently without excessive pressure. Plastic shovels, never metal ones, are recommended for snow removal (although one company, Inteplast, says not to use a shovel at all on its Cevn cellular-PVC deck — use a broom instead). Many liquid deicers are safe, especially when used in proper doses and in conjunction with elbow grease; a plastic shovel should be used for bulk removal once they start to work.

may rarely occur. Nonetheless, a company that says "OK" to ground and water contact has confidence in its product.

Of the wood-based composites, only MoistureShield and its twin product, ModernView Decking, are sanctioned for ground contact (**Figure 13, page 6**). A.E.R.T.'s Brent Gwatney writes: "Due to their manufacturing, ModernView and MoistureShield decking can be used in applications that require deck boards to be installed on or in the ground, or even underwater, without voiding the warranty." Every other WPC maker that I know of requires its decking to be elevated above the ground, setting minimum clearances in its installation manual.

Composites without wood are more commonly approved for ground and water contact. Crawford Industries says of its mineral-HDPE-composite EnduraBoard: "It is 100 percent waterproof. Use any of our profiles in the ground or in the water." The warranty says it won't be damaged by fresh or salt water. And according to Engineered Plastic Systems, the high plastic content of Bear Board makes it impervious to moisture and well suited to wet areas such as pool decks and marine docks. The company says you can build an on-grade deck with its products, using its plastic lumber as joists provided they are supported continuously on the ground.

NyloDeck is also claimed to stand up to moisture — including salt water — around pools and boat slips. Its website reads: "Nyloboard composite products have been used by the marine industry for more than six years for a variety of applications, including transoms, hulls, floors, bulkheads and consoles by the leading boat manufacturers in the United States and Canada."

Neither vinyl nor cellular-PVC materials are absorbent, so there are few worries near water or planter beds. Vekadeck Pro's brochure describes it as impervious to salt water and chlorine as well as being suitable for soil contact. Azek requires no specific ground clearance and says its decking can be used near water. Curiously, even though Gossen also lists its products as ideal for use in high-moisture areas and next to fresh water, salt water, and chlorinated pools, its installation guide requires unobstructed air flow below the decking to prevent heat and moisture build-up. Oddly, the noncellular-vinyl decking makers barely mention how completely impervious to water their products are, despite photos of their decks and docks next to pools and lakes.

Fire Resistance

Since 2008, California has required the exteriors of homes in high-fire-hazard zones and Wildland-Urban Interface (WUI) fire areas to meet specific fire-resistive measures. Other areas of the country have or are considering similar requirements. Decks are a big part of this. Unfortunately,

synthetic decks, like wood decks, are combustible. However, just as wood species vary in their ability to burn, synthetic deck materials don't support flame equally.

As is done for other building products, decking materials are tested for their ability to support combustion. The test method measures flame growth on the underside of a horizontal test specimen. These results are tabulated in a Flame Spread Index, a relative scale in which asbestos-cement board has a value of 0, and red oak has a value of 100. A deck board that tests in the 0–25 range earns the top flame-spread rating, Class A. Boards testing in the 26–75 range are listed as Class B; testing in the 76–200 range yields a Class C. For comparison, redwood (70) and western red cedar (70–73) are Class B decking while untreated southern yellow pine (130–195) is Class C according to the American Wood Council.

California's State Fire Marshal produces a WUI products handbook that lists building materials approved for use in these sensitive fire zones. Most synthetic decking listed in the handbook has either Class B or Class C flame-spread ratings. However, four cellular-PVC decking products did earn a Class A rating: Fiberon/Sensibuilt (now called Outdoor Flooring), Inteplast's Tuf board Deck, TimberTech's XLM, and Trex Escapes. Only one composite, Cali Bamboo's BamDeck, earned a Class A rating. Two tropical hardwoods and one chemically-enhanced pine (DreamDex) also have tested as Class A. Interestingly, despite the fact that ipe is often referred to as having a Class A flame-spread rating, the three ipe deck products listed in this publication all were rated as Class B.

Low Maintenance, Not No Maintenance

Clearly, synthetic decking has come a long way from its roots in the 1980s, with improvements made in answer to customer demand. Even so, there isn't a deck board on the market that's entirely immune to stains. Builders and homeowners need to read the installation and care guides carefully to determine which substances and items can mar the finish of their synthetic deck, particularly a PVC deck.

One point that gets lost in the chatter is how marketing has changed. Earlier versions of synthetic decking were often touted as being "maintenance free." While few, if any, manufacturers actually said this, hardly anyone denied the message. This set customer expectations unrealistically high, leading to both disappointment and lawsuits that tainted the entire industry. Today's synthetic-decking manufacturers are far more careful in their marketing, but the idea of "maintenance-free decking" still lingers in some consumers' minds. A wise deck builder will follow the manufacturers' lead in managing customer expectations about issues such as staining and maintenance. Coupled with improvements in the products, it seems quite likely that synthetic decking will continue its successful run. ❖

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Sources of Supply

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Azek Building Products
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Cali Bamboo
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CertainTeed
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608/875-7040
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Enduris
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Engineered Plastic Systems
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Fiberon
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Genova Products
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Gossen Corp.
800/558-8984
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Green Bay Decking
877/804-0137
geodeck.com

Guardian Industries
800/569-4262
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Inteplast Group
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L.B. Plastics
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Midwest Manufacturing
715/876-5555
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Natures Composites
877/810-4029
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Nyloboard
770/385-6168
nyloboard.com

Rhino Deck
800/535-4838
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Royal Building Products
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