ROOF DECKS A to Z

Part XIV: Structural Fiberboard Roof Deck Planks

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ABSTRACT

This is the fourteenth in a series of articles examining various deck types. Among the numerous considerations when selecting a roof system, the type of substrate is among the most important. With the variety of decks to be encountered (both new and old), it is incumbent upon roofing experts to be the authority on these matters. This article will explore decks manufactured from compressed wood fiber or paper that has been reconstituted into a plank substrate for roof coverings.

It is difficult to generically classify structural fiberboard planks as a form of roof deck. Often referred to as 'wood fiber,' the material can instead be manufactured from recycled, re-pulped newspaper. Both, of course, are derived from plant cellulose and contain lignin (the cell walls of plants) so, for our purposes, fiberboard should be distinguished among two types:

- wood-fiber products containing a resin binder and a water-resistive coating (such as paraffin and/or asphalt), or
- post-consumer recycled material (paper and newspaper). Although similar in composition to papier-mâché, physical properties would be much different, as this material is compressed under high temperature and pressure.[1]

Sawmill waste (such as wood chips, sawdust, and wood scrap) can also be used along with other plant materials such as straw, sugar cane, or bagasse (dried sugarcane or sorghum stalks). Indeed, traditional wood-fiber insulation was often termed "vegetable fiberboard." But fiberboard deck offerings are considerably different by virtue of being a "structural" component and should not be confused with lighter-density insulation and sheathing materials.

Somewhat obscure in terms of today's overall market share, fiberboard decks are more likely to be encountered on older structures. **Figure 1** depicts an application over a rather long span of tapered steel beams and columns.

Homasote, founded in 1909, is perhaps the leading vendor of such deck planks, and technical literature from that firm was used substantially (by permission) in the development of this article. But Homasote is a company name—like Celotex—and not a specific product identification; in similar fashion, it would be wrong to say, "Go install some Celotex on that building while I run a Xerox." The Homasote deck product contains no adhesive; instead, it is held together by surface tension and by a process called fibrillation, where microscopic, hair-like protuberances on the interlocking fibers mesh together. Classic hydrogen bonding is also a factor, much as it is in papier-mâché.

Figure 1. Somewhat obscure in terms of modern market share, structural fiberboard decks are more likely to be encountered on older buildings. This application involves tapered steel beams/columns forming a rather long-span occupancy. Image courtesy of William J. Hope, RBEC, RRC, RWC, REWC, RRO, PE, CCS, GRP, CSRP (Exterior Consulting and Roof Management, Albany, NY).

Other variants in the marketplace have carried names such as Insulite, Masonite, Millboard, Beaverboard, Pinboard, Caneboard, Pinex, and several others.[2] As can be seen, there is a wide variety of fiberboard in the construction domain, and ASTM C208, *Standard Specification for Cellulosic Fiber Insulating Board*, is the standard for classifying such products. The following discussion is limited to structural deck planks, not wall sheathing or insulation board.

Figure 2. Marketed for both pitched and low-slope configurations, failure of the covering could compromise the planks. Here, shingles were used at a slope much too shallow for proper service, and the deck has suffered as a consequence. Image courtesy of William J. Hope.

Figure 3. Corrosion of roofing nails observed at exploratory opening shown in Figure 2. When wet for extended periods, wood-fiber products can be aggressive to some fastener types. Image courtesy of William J. Hope.

The underside of structural fiberboard decks was usually left exposed but the surface was sometimes plastered over, sometimes painted over, and sometimes left bare or clad with decorative ceiling tiles. Occasionally, the older products contained asbestos.[3] It has for decades been marketed in both pitched and low-slope configurations; accordingly, the deck is nailable and moppable. It is still being manufactured and can be obtained through various building material outlets. **Figure 2** depicts shingles and felt over structural fiberboard decking. This particular application was at a slope much too shallow for proper service, and there was water damage compromising the integrity of the planks as a result. This is no indictment of fiberboard decking, as most other substrates will behave adversely when the covering fails, and the matter is discussed further below.

Corrosion of roofing nails (**Figure 3**) was recorded at the exploratory opening. When wet for extended periods, wood-fiber products can be aggressive to some fastener types.[4] The ability to hold fastening devices and attain desired wind ratings is naturally important, but this concern is shared with any other deck type. For low-slope applications, threaded devices would be preferred over nails and spike, and fastener pull-testing should be carried out in the course of roof system selection.

These decks are well known for desirable sound-absorbing qualities. **Figure 4** depicts a sample of deck plank with a perforated underside which had been painted. Vintage sales literature depicts structural fiberboard planks in a residential setting (**Figure 5**). Exposed beams are part of the appeal for this deck

Figure 4. Samples of deck planks showing perforated underside which had been painted. The perforations impart appealing acoustic properties just as with ceiling tiles having equivalent design. Image courtesy of William J. Hope.

Figure 5. Vintage sales literature depicts structural fiberboard planks in a residential setting. Exposed beams are part of the appeal for this deck type. Again, the underside of planks could be painted or left bare. Image by permission from Homasote Co., West Trenton, NJ.

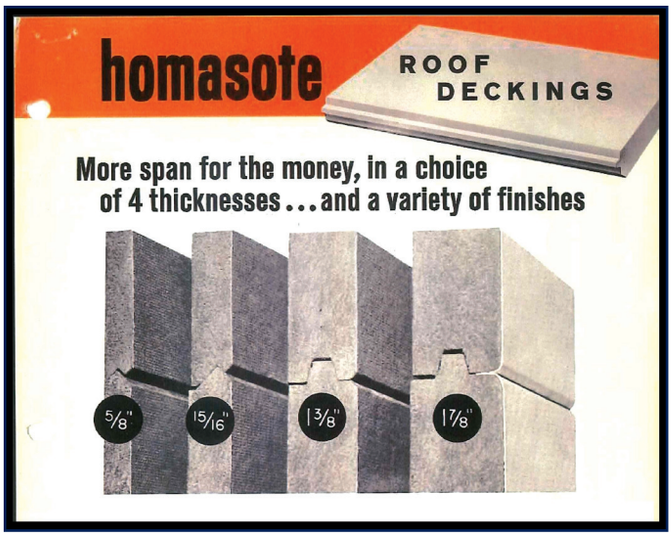

Figure 6. The product is supplied in varying thicknesses with a couple of edge configurations. Image by permission from Homasote Co.

type, but combustibility of exposed beams and decking is always a concern since the assembly is not sprinklered below. In the case of Homasote, a UL Class A-rated product is marketed (Firestall® in natural finish only).

The product was (and continues to be) supplied in varying thicknesses with a couple of different edge configurations shown in **Figure 6**. Just as with structural cement fiber decking, tongue-and-groove edges advance, but all butt joints must fall on framing members—a measure that should be observed on all plank and sheathing materials used as decking (**Figure 7**). Moreover, panel ends must not project beyond framing at roof edges (that is, no cantilevers, eave overhangs, and the like). If such decking is intended as an overhang, it must be supported at all outside edges and ends with additional framing members.

Planks can be nailed or screwed down to wood or metal framing components (**Figure 8**). Structural fiberboard is well recognized as a bracing component to resist lateral racking from seismic and wind loads.[5] With appropriate fastening devices and tongue-and-groove edges advancing, the planks can serve as a shear diaphragm as well as substrate for the roof covering.

Figure 7. Manufacturers' recommendations state that butt-joints must occur on framing members. Beyond this, panel ends must not project beyond framing members at roof perimeters; that is, planks are not intended to be in an exposed-eave arrangement. Image by permission from Homasote Co. (Note: This photo was taken prior to current safety standards.)

Figure 8. The product can be screwed down to metal framing elements. With appropriate fastening devices and tongue-and-groove edges advancing, the planks can serve as a shear diaphragm as well as substrate for the roof covering. Image by permission from Homasote Co.

ASPECTS OF REROOFING

Again, structural fiberboard decks are considered nailable and moppable. By virtue of many being decades old when encountered, adding insulation to these decks will likely be a consideration for upgrade. For pitched roof assemblies, thermal efficiency can be improved by adding nail-base roof insulation products (a product explored in Part 9 of this series).

Minimum and maximum slope demands should be observed regarding the roof system selection. Because ambiguity persists regarding the topic of slope, it may be worthwhile to review some recognized definitions. From IIBEC's *Manual of Practice*[6]:

- **Steep roofing:**
  - — A sloping roof designed to shed water rapidly rather than resist water pressure as a roofing membrane does on a low-slope roof; generally, the slope is greater than 3:12 or 25 percent (IIBEC).
- **Steep-slope roofing:**
  - — A category of roofing that includes water-shedding types of roof coverings installed on slopes exceeding 3:12 or 25 percent (NRCA).

Regarding low-slope assemblies, any number of one-ply membranes could perform on this substrate. While structural fiberboard itself may indeed be compatible with hot bitumen, direct mopping to the surface would be an unlikely selection in current practice. That would bring up whether or not to use a primer, whether to tape the joints, issues regarding kettles, and other issues. A more plausible configuration for bituminous roofing would be to fasten a base sheet (using caps or plates) followed by desired layers of insulation and the membrane plies. This would be done in the same manner as if the roof were being constructed over plywood, structural cement fiber, gypsum, lightweight insulating concrete (LWIC), or other nailable decks. Moreover, it brings up the same interest in condition of the core material and fastener holding power, so the intended devices should be tested and evaluated for use. If bituminous roofs are to be matched with structural fiberboard planks, serious consideration should be given to cold-process assemblies.

SUMMARY REMARKS

The practitioner encountering old roof planks of this type may be inclined to replace or overlay it with another deck system. However, age alone is a poor reason for replacement; unless ongoing neglect has compromised the material, there is no compelling reason to change it in favor of something newer.

Just as with any reroof project, the designer should be aware of possible code upgrades since the original construction, changes in the treatment of drifting snow loads, how to execute localized repairs, embellishing attachment to existing framing elements, thermal and drainage improvements, where and how to configure a vapor retarder if needed, and energy-efficient coating/surfacing. Yet none of the foregoing parameters is really unique to structural fiberboard roof decks. IIBEC

REFERENCES

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Don Kilpatrick

Through his 36 years of uninterrupted service with Inspec, Donald Kilpatrick has been privileged to witness a wide variety of existing conditions in our built environment. His customers have come to appreciate his expertise and client-centric, hands-on approach of project management from design to construction. Kilpatrick has been a regular contributor to IIBEC Interface *and is a previous winner of the Horowitz Award.*

President Biden. Photo by Evan Vucci/AP.

Biden Administration's Infrastructure Plan Contains $100 Billion for School Building Upgrades

Settling the long-running dispute between the parties that school construction is a state and local responsibility, the American Jobs Plan includes $100 billion in funds for public school upgrades and construction, with $50 billion to be provided through direct grants and $50 billion provided through bonds.

President Joe Biden spoke of the need for updated school facilities in a press conference on March 25. "How many schools where the kids can't drink the water out of the fountain? How many schools are still in a position where there's asbestos? How many schools in America that we are sending our kids to don't have adequate ventilation?" he asked. "There's so much we can do that's good stuff, makes people healthier, and creates good jobs."

The administration said the priority for school construction funds in the American Jobs Plan is to ensure schools are "safe and healthy places of learning for our kids and work for our teachers and other education professionals, for example by improving indoor air quality and ventilation." American Jobs Plan funding would also be used for "cutting-edge, energy-efficient and electrified, resilient, and innovative school buildings with technology and labs that will help our educators prepare students to be productive workers and valued students."

The second major initiative of the administration will prove to be tougher than passing the coronavirus relief package. The administration will face dissenters within the party, a very narrow majority in both chambers of Congress, and, if Republicans don't back the plan, the need to pass the bill using an obscure parliamentary maneuver called "reconciliation." Biden and Congressional leaders have set a completion date of this summer, so keep watching this space for updates on this issue.

If passed, this one provision could directly benefit IIBEC members by allowing school districts nationwide to modify and upgrade their building enclosures, leading to a mini building boom in the sector.