Gypsum Fiber Board

by George Green

Christina Hemingway's basement in Wilmington, Massachusetts is being refinished. Ordinarily, that wouldn't be very exciting to anyone except Ms. Hemingway and her husband Peter, but the material lining the walls and ceiling of their basement has never been seen on any wall or ceiling in this country before. It has been fastened with staples, and the joints finished without tape. Yet this is gypsum board--a new product known as gypsum fiber board--produced by Highland American. Ms. Hemingway is Gypsum Product Manager of Furman Lumber, Inc., and an investor in Highland American. She is also heading up its sales arm and marketing effort--which is why her basement happens to be covered with gypsum fiber board

Gypsum fiber board (we'll call it GFB for short) is about to come up out of the basement and into the marketplace. Two companies, Highland American (HA) and Louisiana Pacific Corp. (LP) are readying plants for production. HA's plant, with a planned annual capacity of 150 million sq. ft., is located in East Providence, Rhode Island; LP intends to produce 250 million sq. ft. annually in Port Hawksbury, Nova Scotia. So, interestingly, both companies will be initially competing head to head in the Northeast.

The Product

What is GFB, and how does it differ from gypsum board that has been around for about 50 years? For starters, it does not have paper on the face, but has paper fiber in the core. In fact GFB has more paper in it than gypsum board has on it, and accordingly GFB is tough stuff.

According to John Godfrey, president of Highland, a similar product has been in use in Europe for the past eight years and has captured 25% of the market in Germany. The European product is a hefty 3060 lbs per 1000 sq. ft. in 1/2" thicknesses. It is much heavier than that proposed by either LP or HA for general use, both of whom are aiming for 2300 lbs. This is still quite a bit heavier than conventional 1/2" gypsum board, which averages about 1750 lbs. HA is also offering a 7/16" board weighing in at about 2000 lbs. for special applications, such as in schools and other public buildings where the extra strength and toughness are needed.

Will Gypsum Fiber Board replace regular gypsum board? This article compares the two products.

Though it is tough, GFB is a simple product containing mostly gypsum, ground up newspapers, and expanded perlite. The latter replaces some of the gypsum to replace weight. LP's literature offers their FiberBond (tm) product in thicknesses of 3/8", 1/2 and 5/8", in sizes of 4' x 8', 9', 10' and 12'. But spokesman Dave Keef says they can make it in any size up to 8' x 24', and this has the manufactured housing people ecstatic. I can imagine why--whole walls with no joints! But wait a minute. Those guys have always been very weight conscious. GFB is heavy. They may have second thoughts. We shall see. HA is naming their version of GFB Gypsonite (tm) and, in addition to the thicknesses available from LP, will have the 7/16" thick version for the D-I-Y trade and sizes up to 8' x 20' on special order.

The Process

Orderly is a good description of HA's manufacturing facility. Bonnie Skelly, who is the Technical Director for HA, was delighted to show me around. The rock pile, crushing and grinding equipment, and two kettles look very familiar to anyone who has been in a gypsum board plant. Even the perlite "popper" is not unusual, but from thereon things start looking much more exotic.

The exotic equipment in the plant is supplied by Wurtex of West Germany. The paper handling equipment is quite elaborate. Old newspapers are shredded to postage stamp size pieces in a hammer mill and transported to a separator where metal and scrap are removed. The usable individual fibers are deposited in a

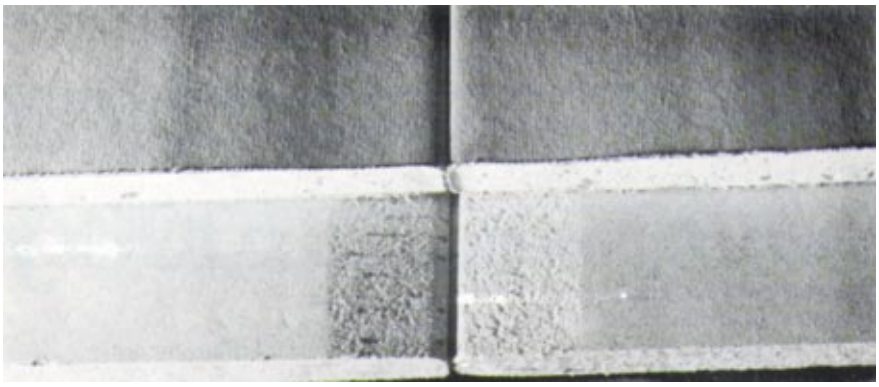

Fig 1: Comparison of HA taper to regular gypsum board (on top).

special mill and dampened with a small amount of water. Calcined gypsum is added, and, for the center layer, some expanded perlite. This blend is spread on a 9-ft. wide belt in three layers. A small amount of additional water is sprayed on the material, resulting in a 2" thick fluffy, damp mix.

This wet mix is carried relentlessly at 40 ft. per minute toward giant pincers (officially known as a Kusters continuous press) which gradually mashes the moist mixture until it emerges in a 1/2" thick, 8 ft. wide continuous sheet. Next it is cut with water.

Yes-water. Fine jets of water, under tremendous pressure, zip across the sheet and, precisely and cleanly, cut it into the desired size, 4' x 8' or whatever. Next, it's on to the dryer. Ms. Skelly explained that the dryer is quite a bit different from a regular gypsum board dryer, but I'll have to take her word for it. All I could see was a giant box that the board disappears into.

Once out of the dryer, some interesting things happen. First, saws cut a taper and a bevel on the sides and ends. That's right, a taper on the ends (Fig. 1) which should help with butt joints. Two sanders smooth the face and a coat of silicone is then sprayed on to seal the surface, making it paintable and water resistant.

LP uses somewhat different equipment made by Schenck, another German firm, and a continuous press by Washington Iron Works.

The Properties

Both LP and HA make similar claims for their products. Let's look at these claims and attempt to compare them to regular gypsum board.

Environment

Claim: GFB is helpful to the environment because it uses a lot of waste paper.

So does regular gypsum board; the paper covering is made almost entirely from recycled paper. GFB, however, does use four to five times more. Mr. Godfrey estimates HA will use about 75 tons of waste newspa-

pers every day. If LP uses the same percentage, they will chew up about 125 tons of old newspapers each day.

Advantage: GFB

Easier Installation

Claim: GFB will be easier to install and thus save on labor costs. Since there are several steps in installation, we will break them down into joint finishing, scoring and snapping, and fastening.

Joint Finishing

The labor saving claim is based mainly on the development, by both companies, of tapeless joint compounds. They have made much of the labor savings by eliminating the taping. Let's visit Ms. Hemingway's basement and see how this is done. First the board is beveled and tapered. Ms. Hemingway demonstrated how a bead of the base coat is applied in the bevel from a caulking gun, then wiped down with a

Fig 2: HA employee Raymond Harvey applying finish coat to GFB.

Fig 3: HA joint system.

narrow broad knife. This material dries tough and rubbery. It will give but won't crack, and it bonds the boards together as well as tape. In fact, Ms. Skelly has tensile tests to prove that the joint is stronger than a taped joint.

After the joint dries overnight a finish coat of compound from a 3-1/2 gallon pail is applied in the taper with conventional finishing tools (Fig. 2). Another night of drying and the finish can be sanded. Three steps: base coat, finish coast and sanding (Fig. 3). The joints I saw in Ms. Hemingway's basement look good. They compare with two coats over the tape in conventional drywall finishing, which takes four steps: taping, first coat, second coat and sanding. Therefore, logically the tapeless system should save about 25% in labor costs for the finishing operation. However contractor John Schneider, who did the finishingwork in the basement, estimates that it would take him only about half the time to complete a job than normally. But, and this is a big *but*, if these tapeless compounds works well with GFB, there is no reason that they won't work just as well for conventional gypsum board.
Advantage: Neutral

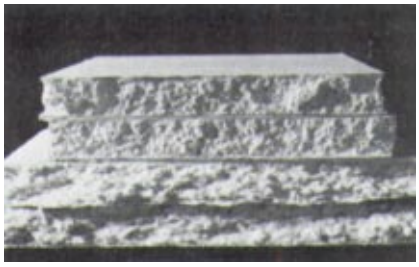

Fig 4: Comparison of score and break (two pieces of gypsum board on top of two pieces of GFB).

Scoring and Snapping

Gypsum board can be easily scored and snapped. Can GFB? Surprisingly, the answer is yes. I had to be shown to be convinced, and even scored and snapped a piece myself. It needs to be scored a little deeper (but only on one side), and snapped with a little more care (it is best done on a table, or a stack of board, with the score lined up with the edge), but it can be done. The edge is a bit rougher (see Fig. 4), but can be easily smoothed with a rasp. It can be done, but it's a bit more diffi-

cult than regular gypsum board. Cut-outs for electrical boxes, etc. are best handled with a keyhole or sabre saw.

Advantage: Gypsum board.

Fastening

GFB can be fastened with staples or a nail gun--easily; a real advantage that has not been promoted by either company as yet. Stapling has to be faster than nailing or screwing. It appears to be particularly helpful for ceiling installation, since it only takes one hand to operate a power stapler.

Advantage: GFB

Fire Resistance

Roth companies are claiming, based on European tests, that 1/2" GFB will pass the one-hour Type X test, thus making it equivalent to 5/8" gypsum board, but no U.S. tests have been run as yet. There are two problems with this claim. First, Europe uses a different test method. We don't know if the North American version can pass the ASTM Type X test or not.

Advantage: If it passes: neutral (it will weigh as much and cost as much as 5/8" Type X gypsum board.) If it fails: gypsum board.

Sound Transmission

"GFB will have twice the sound resistance of gypsum board." It should have better sound transmission. It's heavier. The heavy board should be nearly twice as good because it is nearly twice the weight. This may be of some advantage in commercial construction, where 50 STC walls could be possible with thinner wall assemblies, and the light weight (2300 lb.) GFR should equal the sound resistance of 5/8" gypsum board.

Advantage: GFB

Sag

GFB will sag much less than gypsum board. Under certain conditions of high humidity or wetting from spray applied textures, gypsum board will sag. That's why gypsum board manufacturers require 5/8" board on ceilings on 24" centers under those conditions. HA lab tests indicate that GFB will have virtually no sag under the same conditions in which 1/2 gypsum board sags more than one inch. That is significant.

Advantage: GFB

Strength

Strength properties are the major claim to superiority for GFB and there is no doubt about the strength, hardness, and toughness of the heavyweight board as manufactured in Europe. Table 1 makes some comparisons based on information received from HA and ASTM specifications for regular gypsum board. LP did not provide specifications. As can be seen, the flexural strength of the 3060 lb. board is superior to gypsum board if compared to its weakdirection. GFB has about the same strength in both directions. HA did not have MOR data available for its lighter weight version as of this writing. The big difference is in the nail pull, however, which tends to show the cohesive or internal strength (toughness) of the board.

Advantage: GFB

Physical Properties						
Properties	Gypsum Fiber Board[1]		Reg. Gypsum Board[2]			
	3080 lbs	2300 lbs	1/2"		5/8"	
			CD	MD	CD	MD
MOR[3], psi	870	725	770	280	672	224
Flexural[4] Str., lbs	124	104	110	40	150	50
MOE[3], psi	325,000	300,000	N/A	N/A	N/A	N/A
Nail Pull[4], lbs	240	160	80		90	
Cobb Test[4], g.	1.6	1.6	1.65		1.65	
Humid Deflection[4]	1/8	1/8	1 1/8"		5/8"	

Notes:

1. Proposed minimum specifications for 1/2 inch board supplied by HA. The flexural strengthwas calculated from the MOR (modules of rupture).
2. ASTM C36 specifications for gypsum board, except as noted. The MOR was calculated from the flexural strength specification. Note that MOR is not a valid concept for gypsum board, since it is not a homogeneous material. The numbers are just for the sake of comparison.
3. Test method is ASTM D 1037
4. Test method is ASTM C 473
5. ASTM C79 for Gypsum Sheathing

Summing up

So what does all this mean to drywall contractors? Will you use this product at all? Are these two companies throwing money down an empty mine shaft? Will regular gypsum board become an endangered species? Not being a vaticinator, I will not even *try* to answer those questions. The future will. Lets just sum up the pros and cons of this newcomer and let the hammers pound what they may.

Gypsum Fiber Board	
Pros	**Cons**
Stronger, tougher	Heavier
Less sag	More expensive
Fasten with staples	Harder to score & snap
Larger sizes-up to 8' wide	
Tapered ends	

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