PLAINTIFF'S EXHIBIT
BIR-922

9/14/59 F.P. Reynolds PBL

COMMENTS ON MEMO. OF 9/8/59 ON VISIT TO KOPPERS COMPANY

I hope Norman Olson will push the shipment of the 24 pieces of V-3 Insul-Sheath to Koppers. I also think that he or you should line up a laboratory for the actual compression testing. It may be that Thompson and Lichtner would do this testing, although Norm Olson may know some other laboratory to approach. I think Norm should be sure that he has complete information from Koppers to give to the laboratory making the test.

Paragraph #5 under heading of Panels is also of great importance. I know that you will push the preparation of the 32" x 4' mock-up for submission to Koppers.

On page 4 is reference to F.H.A. approval of Koppers panels. That reminds me of my previous memo. suggesting that Norm Olson get information from F.H.A. on the characteristics of the panels to meet with F.H.A. approval.

I think we also suggested that PBL obtain strain gauges so that tests can be performed in our tensile tester.

In addition to the Hunt Laboratories in Chicago, I'm quite sure that we mentioned Columbia University in New York City. I also suggest that you get in touch with Herb Chamberlain at Phillipsdale since he was investigating racking tests a short time ago.

FPR:o

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MEMORANDUM

BB- Mr. Chamberlain
BBA- Mr. Weed
MB- Mr. Johnston
H- Mr. Reynolds
HL- Mr. Kessler
BC- Mr. Woods

PBL

In Reply to _____ *Date* 9/8/59 *From* PBL *To* _____

Subject VISIT TO KOPPERS CO.

On August 27, 1959 Messrs. Reynolds and Olson visited with Messrs. Edberg and McElhone (Technical Director, Housing Group) of Koppers Company at Kobuta, Pa. The following subjects were discussed.

PANELS

One foot square panels were made by Koppers on their laboratory press using various skin materials which we sent them. The polystyrene foam cores had a density of 2#/cu. ft. since they cannot produce 1# foams on their laboratory press.

1. V3 Insul Sheath (Foil One Side) Used on Both Skins

This sample showed good dent resistance. Koppers is quite interested in this product as an exterior skin material with a weather-resistant coating on the aluminum face. They have only "fooled around" with laminated kraft products but feel there is a great potential here. Koppers has tested two panels with non-treated kraft board skins and found them to have some structural value, giving a compressive strength of 2980# over the 4' dimension of a 4' x 8' panel with 5/64" skins and 3330# for 1/8" skins. Face compression failure (creasing and buckling of skin) at a deflection of 1.1" to 1.2" occurred at the above loads on these 2" thick panels. I believe these skins had a 10 mil aluminum face laminated to them. Modulus values were 600,000# to 700,000# in tension. Some truss systems encountered in conventional construction will exert a 4,000# force over a 4' width.

It was agreed that Bird & Son would send Koppers 24 pieces of V3 Insul Sheath (foil one side) for fabrication into three 2" panels and three 3" panels 4' x 8' for axial compression testing. We will have to have the tests run. If the results look promising, the next step would be to run climatology tests at Penn State.

For use as a skin material on interior partitions, V3 board would have to compete with Gypsum board at $35. to $40./M. V3 has an advantage in being much lighter than Gypsum board.

Koppers also felt that V3 might be used as skins in leisure housing.

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2. V3 Insul Sheath as One Skin and Lauan Mahogany Plywood Other Skin

Not much comment beyond what was discussed above concerning V3. This might be the construction for an exterior wall panel with V3 as the outside skin.

3. Super Vinyl as One Skin and Lauan Mahogany Plywood Other Skin

The Super Vinyl has no dent resistance at all without a back up material. Super Vinyl gives an attractive appearance however.

4. Semi-Pressed Hardboard for Both Faces

This might make a good skin material except for its cost. It is also fairly heavy.

5. Roll Roofing on Semi-Pressed Hardboard as One Face and Lauan Mahogany Plywood as Other Face

The use of a 4' wide roll roofing with a selvage edge nailing strip and a joint insert strip was discussed. Koppers was very enthusiastic about this product. They suggested using #9 granules to give more texture. This roofing would be combined with V3 or other suitable backing material. They are presently working with a cast vinyl sheet which is embossed. The joint between panels is treated with a vinyl insert which is heat sealed on the site with a special tool. The potential low cost of asphalt roofing is of great interest to them. We shall send Koppers a 32" x 4' mock-up of our proposed roofing system with an indication of the price range of such material. Also, our recommendation for an adhesive.

6. Asphalt Shingle as One Skin and Lauan Mahogany Plywood as Other

The asphalt shingle stuck to the press platen ruining the shingle surface.

SKIN MATERIALS

We discussed various skin materials. It was brought out that movement of skins due to temperature and/or humidity changes was a very serious problem. A deflection of 1/4" or so in a

wall panel cannot be seen by the human eye; however, materials such as hardboard will deflect as much as 1" and are unsatisfactory in certain applications.

Mr. Edberg showed interest in semi-pressed hardboard but the price of this product would be high compared with other skin materials. However, he felt that dimensional stability was a very important factor and might make a difference in considering the price. We will advise him of the dimensional stability of semi-pressed hardboard versus 1/4" fir plywood. Plywood is not considered to be very stable; however, it is commercially acceptable.

Cost, strength, and durability were given as the three most important criteria for a skin material. Strength must be adequate to carry normal structural requirements with a safety factor of 2.

PANEL MANUFACTURE

Koppers feels that "foaming in place" is much more flexible a system for making panels than roll lamination. Foaming in place allows complete freedom for changing skin materials rapidly as compared with roll lamination.

Koppers does not feel that there is any need for using self-extinguishing polystyrene for core materials. The South Bend Research House was recently hit by lightning resulting in the welding of one of the bus bars in the fuse box. About half of the circuits in the house were burned out. However, there was no damage to the panels even though the wiring comes in direct contact with the foam in many areas.

KOPPERS' PLANS FOR PANELS

Koppers expects to be manufacturing building panels in their Detroit plant around November 25th or so. Their initial production will be used by development builders in the Detroit area.

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A large West Coast builder is seriously interested in setting up manufacture on the West Coast as a licensee. Bird & Son is still eligible for a license, if we want one.

Koppers has received FHA approval on non-load bearing, load bearing, and roof panels. The various techniques and details of using these panels are presently in the hands of FHA and are also expected to be approved as a system.

Codes have not presented any problem to Koppers. They have received approval everywhere they have been. They said that one of the main reasons for picking the Detroit area for initial use of panels was due to its very strict code. They preferred to start at the toughest spot.

Panel profits, at present, are low for Koppers since they only manufacture the core material. They feel that only one profit can be absorbed in the distribution between the panel manufacturer and the user. Mr. Edberg stated that their panel system is advantageous for cost compared with conventional construction.

TESTING PANELS

Most of Koppers' testing is done by Tsco Engineering in Washington, D. C. This laboratory is closing at the end of October.

Mr. Edberg stated there are two ways of testing panels: 1) Build a small test building using panels and observe its behavior 2) Run accelerated weathering tests on panels. The accelerated tests can be run at Penn State under Prof. Elmer Queer.

Koppers uses three specimens when running mechanical tests on panels. Modulus values are valuable in predicting the uses for a skin material. These can be quite simply performed using strain gauges. For bending tests (roof panels, etc.), Koppers uses quarter point loading. The span-depth ratio is important

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thus a full length panel must be used. For racking tests, Mr. Edberg knew of only one laboratory which performs these tests, Hunt Laboratories in Chicago.

MISCELLANEOUS

We were invited to inspect their semi-commercial installation for manufacturing Dylite panels at Kobuta. However, Koppers requires a restrictive "keep secret" form to be signed before seeing the process. We felt we could not do this and as a result did not see the process.

Koppers is going to attempt to break the St. Regis patent on polystyrene-paper containers. They will do this in Germany first and are very confident of success.

NDO/rp