

PLAINTIFF'S EXHIBIT

GP-1303

SIX MONTHS REPORT
PRODUCT DEVELOPMENT &
TECHNICAL SERVICE DEPARTMENT

January thru June 1975

SGP 0014663

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SIX MONTHS SUMMARY

The list sales and gross profits from products developed at the Tigard Gypsum Lab during the past five years were \$1,632,636 and \$267,347 for the first six months of 1975. A breakdown of the products is on page 3.

The commercialization of the firedoor core was the dominant project during this period. Following the optimization of the formula a one-hour rating was obtained for a 4' x 8' door. In cooperation with Engineering and Manufacturing, a plant for producing the cores was established in Tigard, Oregon and in May the plant was turned over to Western Operations. This plant is currently furnishing cores to Vancouver Door Co. and will be capable of furnishing other door manufacturers as arranged by Sales. The firedoor project is being continued to obtain more test data and ratings to expand the marketability of the core and also to look for improvements and cost savings.

The adoption of a new adhesive system for ready mix is progressing and will save 10¢ to 12¢ per pail at every plant except Akron and also help our raw material procurement situation. All but one Canadian asbestos manufacturer is on strike, so a crash program is underway to reduce our usage of asbestos. Other joint system projects are the formulation of a non-asbestos ready mix and a ready mix with superior working properties.

A competitive wallboard survey was conducted with all gypsum board plants participating. The comparative test results indicated that some improvement in core hardness, taper depth and flexural strength were advisable. Changes were recommended which should make our products acceptable without any increase in cost. Another survey is planned in the next six month period which should reveal how effective the changes were.

We were negotiating with Certain-Teed Products Corporation with the idea of obtaining some development rights under a patent they have for producing gypsum fibers. A validity study turned up information which makes their patent very shaky. We have, therefore, abandoned negotiations with Certain-Teed. The importance of the fibers will be dependent upon proven uses for the fiber. Our interest declined when we found that there is some doubt that they would serve as a replacement for asbestos in ready mix.

There has been an increased interest in 5/16" gypsum board for mobile homes because of the possibility of HUD restricting interior surfacing materials used in mobile homes to products having low flamespread ratings. At the request of Sales, we conducted a series of tests to provide mobile

home manufacturers with some information concerning adhesives, fasteners and bracing. Pre-Dec and Sentinel Board are products that we envision selling to the mobile home industry.

All the projects under consideration are detailed in the body of this report.

SIX MONTHS SALES & PROFITS FROM NEW
PRODUCTS DEVELOPED WITHIN THE PAST FIVE YEARS

<u>Product</u>	<u>List Sales</u>	<u>Gross Profit</u>
Pre-Dec Wallboard (all)	\$ 841,666	\$ 71,236
Sentinel Wallboard	835	10
Firedoor Cores	7,488	2,004
*Vinyl Topping (non-asbestos)	53,553	11,037
*Vinyl Bedding (non-asbestos)	7,315	1,457
*Vinyl All Purpose (non-asbestos)	193,371	50,259
*Triple Duty (non-asbestos)	119,508	27,448
Modified Casein Topping	224,294	60,313
Modified Casein Bedding	68,254	15,512
Modified Casein All Purpose	96,505	24,353
Polystyrene Texture	19,847	3,718
Totals	\$1,632,636	\$ 267,347

*Non-asbestos vinyls sold by Acme and Chicago. Some asbestos products at Acme couldn't be broken out. Does not include interplant shipments of non-asbestos products.

PRODUCT DEVELOPMENT SECTION

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PRODUCT DEVELOPMENT

1. Firedoor Cores

A 3' x 7' firedoor assembled with 20" x 36" pieces of core material had previously been tested successfully for a one-hour rating at Warnock-Hersey. A used press was purchased to form full-size (3' x 7') core pieces and test them in a 4' x 8' door. The core formula was optimized to contain 55% perlite, 24% gypsum, 2.0% clay, 2.0% vermiculite, 13% Portland cement, 3.5% polyvinyl alcohol and 0.3% glass fiber. We arranged for Vancouver Door Company to build the 4' x 8' door and it also successfully passed the one-hour test at Warnock Hersey. Other possible tests will be directed to a one-hour door with plastic laminate skins, a 1½-hour door, and an Underwriters' fire rated door. Cal-Wood, a potential customer, would like a witnessed slam test of a 4' x 8' door.

The plans for a plant operation proceeded simultaneously with the testing. A press, sander and other equipment were set up temporarily in the Tigard Lab to process door cores for evaluation and fire testing. Engineering located a building and planned the layout of the plant equipment. The press, sander, mixer, etc., were relocated to the new building. Additional equipment such as a dryer from Brunswick, a lift truck from Akron, drying carts, tanks for PVA, and boxes for perlite were obtained. Also, a new mixer was ordered. All the equipment except the new mixer was installed in April. It took a couple months to get the operation running smoothly. By the first of July, high quality cores were being produced at a rate of more than 50 per day.

Cores are currently being furnished to Vancouver Door Co. Fire test reports and door assembly procedures have been furnished to Cal-Wood Door Company, Lifetime Door Company and Curtis Door Company, who are all potential customers for firedoor cores.

2. Sentinel Wallboard

The striped woodgrain paper manufactured by Orchard and laminated to 5/16" wallboard has been revived in view of HUD's proposed new flamespread requirements. Western Operations has arranged to have some wallboard paper printed and run on the wallboard machine at Fort Dodge. Some further trials will be made since this would probably be more economical than laminating a separate paper to the board. One drawback of the printed wallboard paper is that a durable and washable clear coating would probably have to be applied.

3. New Ready Mix

An adhesive system consisting of 1.0% Gelvatol 6000 or Air Products 523S and 2% Elvace emulsion has been undergoing market testing. Chicago and Acme have adopted the formula and Marietta and Milford have market tests in progress. In addition to the 10¢ per pail cost savings, our usage of emulsion will be diminished, putting us in a better position in the event of future shortages. Also, two interchangeable PVA sources will make us more flexible. Ancillary advantages are that the emulsion can be added faster, therefore helping increase production and fewer cars of emulsion will be required, so there should be less labor in unloading cars. The market testing so far shows that the product is improved with respect to crack resistance, bond and workability.

4. Ready Mix Topping

The new formula topping developed for Acme, and with their help has received good acceptance. Sales of ready mix topping increased 700% over the same period a year ago.

5. Non-Asbestos Joint Compounds

The non-asbestos vinyl joint compounds being furnished from Chicago were not receiving very widespread acceptance, so another formula was conceived using starch in combination with the vinyl alcohol. This increased the water carrying capacity, made the non-asbestos vinyl more like a casein product and now it is receiving better acceptability. All of Chicago's production has been converted to the starch-vinyl formula.

The effort to come up with a non-asbestos ready mix has been more difficult, but this has been given a high priority in view of the increasing demand for asbestos-free products.

6. Gypsum Fibers

Most of our effort has been to find applications for the fiber and to assist in the validity study with Schuyler, Birch, Swindler, McKie & Beckett. Trials of the fibers in metal casting have been reported to be very successful. A field trial of the fibers in wall texture has also

been favorably reported on. Not much has been done with the fibers in joint compounds because of the priority of other projects and the lack of incentive due to the fibers not being commercially available. There is considerable doubt that the fibers are stable enough to use in ready mix and this is another minus factor.

There are many possible uses, such as in spray fireproofing and flocking for Christmas trees, so there still could be some good potential volume for the fibers. The next step should be a pilot plant to produce a sufficient quantity of the fibers to evaluate other uses and to determine costs of producing the fibers.

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MANUFACTURING SERVICES SECTION

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MANUFACTURING SERVICES

1. Wallboard

a) Competitive Board Survey - Each gypsum plant was asked to get field samples of three competitors $\frac{1}{2}$ " wallboard in addition to samples of their own manufacture. Half of the samples were sent to Tigard and half were taken to the plant. The boards were tested here for weight, caliper, edge formation, edge hardness, end hardness, core hardness, sag, flexural strength, bond, appearance and nail pull resistance. One purpose of the survey was to acquaint the plants with some of the new ASTM test procedures that replace the old minimum weight requirements.

We found a need for improvement in core hardness, flexural strength, end grinding and taper depth. A somewhat deeper taper and a very slight reduction in thickness tolerance was suggested with the weight being held constant. This should help the core hardness. A one pound increase in the minimum tensile strengths for ivory paper was recommended to increase flexural strength, and the plants were requested to concentrate on improving end grinding. All recommendations are to be implemented and another survey planned in six months to determine how effective the changes have been.

b) Vapor barrier for wallboard - An investigation of wax vapor barrier coatings was conducted to see if they would be less expensive than the foil vapor barriers we use. The testing showed that it was necessary to use a mixture of Elvax resin and wax to minimize blocking (sticking together). However, even with as much as 15% Elvax, some of the panels still blocked at 90°F and 50 psi. In order to obtain vapor barrier properties approaching foil, it was necessary to use 25 lbs./M of the wax coating. At this rate the wax coating is as expensive as foil, so there is no merit in pursuing the investigation.

c) Chemical Division wax/asphalt emulsion - The Chemical Division is considering the manufacture of the wax/asphalt emulsion we use in sheathing and tile backer board. We have evaluated a number of samples and it appears that they now have a formula which will provide sufficient water resistance. The addition of fully hydrolyzed polyvinyl alcohol was discussed and they will try this to increase the efficiency of their emulsion. After stability tests have been made, a plant trial of their emulsion will be arranged, possibly at Brunswick, since the emulsion will be made at Savannah.

d) U.L. Quality Assurance Program - Eastern Operations has now adopted the new U.L. procedure of more inspections by plant personnel and less by U.L. The objective is to reduce our label service costs by 40%. If Eastern Operation's experience is successful, the Western plants will apply to U.L.

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e) Field Service - Joe Watt has been doing considerable field work for Western Operations. Some has been in conjunction with the sales of 5/16" board to Champion Homes in Weisser, Idaho and the rest to assist with various customer complaints and problems.

2. Joint System

a) Airborne asbestos fiber measurements - A procedure was established for measuring airborne asbestos fiber. This method involves sampling through pumps worn by plant personnel. The air is pumped through a filter at a given rate so that the volume of air filtered is known. The number of fibers on the filter are counted by the phase microscope method and a computation made of the fiber content per cubic centimeter of air. The current OSHA regulation calls for a minimum of 5 fibers per cubic centimeter. This will change to 2 fibers per cubic centimeter in 1976.

Thus far, Akron, Chicago, Milford and Marietta have been monitored. Acme will be measured shortly. All measurements taken were less than the 5 fiber/cubic centimeter OSHA limitation. However, some measurements taken of the man who adds the raw materials have exceeded the eventual limit of 2 fibers per cubic centimeter. Where the measurements exceed the OSHA limits, dust masks are essential. Test reports from each plant will be on file in the Operations Office, at the respective plant, Mr. Hurd's office and the Tigard Lab. OSHA requires that these measurements be made at each plant every six months. Having this done on the outside would have cost about \$2,000 per year per plant, or a total \$10,000 annually.

b) Grit problem - A recurrence of the grit problem necessitated removal of Calgon T from our ready mix formula. The Calgon precipitates magnesium ions which congregate to form grit particles. There was some concern that this would adversely affect product acceptance, but the removal of the Calgon took place without any reaction.

c) Cracking problem - A revision in the formula at Milford was found necessary to improve the crack resistance. This formula contains more mica, less asbestos and less emulsion. A recent survey of the Baltimore-Washington market indicates that the new formula has overcome the cracking problem.

d) Asbestos shortage - All the Canadian asbestos suppliers except Johns-Manville are on strike, including our major supplier, Phillip Carey. We purchase asbestos from Union Carbide in the U.S., but they are currently oversold as well. A different type of asbestos (7RF02) is being purchased from J-M. A reduced quantity of 7RF02 asbestos is being used without affecting the acceptance of our products. The problem is that not enough total asbestos from Johns-Manville and Union Carbide is available for our needs. All the plant asbestos inventories are low and we are facing interruptions in our production schedules. A reduced asbestos formula is under development to stretch our inventories and prevent any loss of production.

SAFETY REPORT

e) Preservatives - After finding and testing a non-mercurial preservative, we find that the manufacturer (Olin Chemical) doesn't have it listed with the EPA. Apparently our potential use would not be sufficient justification for them to do so. Another non-mercurial called Cosan is under investigation.

3. Analyses

About 15 to 20 gypsum analyses are conducted each month. The samples submitted have included plant rock specimens, competitive samples and potassium sulphate (for salt content).

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SALES SERVICES SECTION

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SALES SERVICES

1. 5/16" Gypsum Board for Mobile Homes

A paneling committee consisting of representatives of the Distribution Division, Gypsum Sales and the Gypsum Lab was formed. The purpose was to prepare for changes in mobile home construction that will be forthcoming as a result of the incidence and severity of mobile home fires. The data we already had was reviewed and it was decided to develop more technical information for use in the promotion of gypsum board in the mobile home industry.

A series of racking tests was conducted to develop information concerning the use of 5/16" wallboard in mobile homes. Fastener spacings, different adhesives and various structural reinforcements were tried. At the request of Sales, we also talked to Bendix Homes who are conducting their own tests. Adhesive will be recommended because mobile home manufacturers want to minimize fasteners. Mastic adhesive gives the best results because of its bridging characteristic and because it stays resilient when it dries. However, it looks like white glue will be preferred because of the difference in cost. Plywood let-in bracing over window and door openings was found to be very effective. This is particularly important because the window and door openings are the weak links in the mobile home structure. At the request of the Distribution Division, two witnessed tests will be made of Sentinel Board, one with white glue and one with construction adhesive.

2. I-Stud Shaft Wall

We provided assistance in the fire and uniform load testing of the I-Stud shaft wall system. The tests were sponsored by Studco, who fabricated the special metal I-studs. We should derive some business as a result of our participation in the testing. We have suggested that the I-stud system be included in our Sweet's literature.

3. Field Service

Joe Watt has been doing considerable field service work in his dual responsibility which includes technical service for Western Operations. His activities have included various visits to Champion Homes in Idaho to review their special requirements for 5/16" board for mobile homes. George Fowler has been involved in considerable field service and field testing, particularly in the Baltimore, Washington, Atlanta and Chicago markets.

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INDUSTRY REPRESENTATION SECTION

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INDUSTRY REPRESENTATION

ASTM

1. Wallboard Performance Standards (C36)

U. S. G. has withdrawn their objection, so the new ASTM wallboard performance standards are now in effect. The minimum weights have been eliminated and requirements for end, edge, core hardness and sag resistance have been added. Also, the cross directional flexure strength has been reduced.

Another revision has just been submitted to include 5/16" wallboard in C36.

2. Type X Bench Test

The Houser type x test was rewritten by us and the test method has been proposed to be included in ASTM C473. The next step is to have the Houser bench test replace the current definition of type x board in the C36 standard.

3. Predecorated Board

A round robin test series is in effect to evaluate methods to test pre-decorated boards for durability, washability and pick resistance. A standard for predecorated board has already been written, so all that will be required is acceptable test methods and minimum values.

Gypsum Association

1. Technical Committee

A 1975-1976 Fire Resistance Manual was completed and is ready for distribution. The process of revising the manual every two years to keep it current seems to be working well, and the format is improved each time.

Also, a modern standard for the application of gypsum board was prepared and is now being distributed by the Association. This was necessitated by the controversy in ASTM and the delay in promulgating an ASTM standard.

Other major subjects of the Technical Committee are the fire and sound testing program, specifications for 5/16" board, specifications for 5/8" type x sheathing, potential heat tests of gypsum products and the research associate program.

2. Material Handling Committee

The principal project is to get alternate flatcar loading configurations approved by the AAR. Three alternatives are to be presented to the AAR in the near future with a request for test loads to be run. These alternate methods would result in estimated savings of \$35 to \$50 per car.

Other projects include getting an exemption in the American Paper Institute Manual covering gypsum paper rolls in rail boxcars, updating the materials handling training film and preparation of material for publication--third revision of the Materials Handling Manual.

PATENT & LICENSING SECTION

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PATENT & LICENSING1. Firedoor Composition

A search indicated that there is no prior art which should stand in the way of a patent on the firedoor formula. We have asked Synnestvedt & Lechner to submit the patent application on the basis of our present knowledge. Later on it may be advisable to file a continuation application.

2. Gypsum Fibers

A validity study of the Franklin Key Patent No. 3,822,340 has shown that the patent probably is invalid. There is also some question about the market for gypsum fibers, so the discussions with Certain-Teed relative to an agreement, have been discontinued.

3. PVA/Asphalt-Wax Waterproofing

The patent examiner has refused to grant the wider limits of polyvinyl alcohol which we had requested. We decided to allow the patent to issue with the narrower limits. The ranges we tried to achieve are probably outside the economic feasibility anyway.

4. Nitto Gypsum, Ltd.

Samples of gypsum products have been exchanged and prices have been furnished to this Japanese company, but it doesn't look like any sales arrangements or license agreements will result.