BESTWALL GYPSUM COMPANY

SEMI-ANNUAL RESEARCH AND DEVELOPMENT REPORT

Jan. 1, 1964 to June 30, 1964

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FOREWORD

This report covers the activities and accomplishments of the Research Division for the first 6 months of 1964. There has been no personnel change in the Research Division during this period.

It was estimated last January that the total 1964 R&D expenditures would approximate $150,000. The first half figures show that $65,895 has been spent thus far.

The Research Division had its third anniversary in June. A rundown of the last 6 months' market performance of products resulting from our efforts since that time follows. Some of the accomplishments, such as fire ratings acquired, cannot be directly assessed. However, the fact that our 1/2" Firestop sales are up 106% and our 5/8" Firestop sales up 27% for the first 6 months of 1964 over a like-period in 1963 is a good indication of the value of this effort.

The major portion of this report is devoted to the progress made on the various projects during the past 6 months. It is divided into three sections, namely:

1. Projects Completed
2. Projects Nearing Completion
3. Projects Underway

*MARKET PERFORMANCE OF NEW PRODUCTS

JANUARY THRU JUNE 1964

	PRODUCT	SALES VOLUME	MILL BASE SALES	ESTIMATED GROSS P.
1.	Firestop 120 Ceiling Tile	306,000 sq.ft.	$ 42,371	$ 12,[illegible]
2.	"Grabit" Masonry Adhesive	22 Tons	4,211	2,[illegible]
3.	One Day Joint Compound	264 Tons	46,633	12,[illegible]
4.	Dens-Cote Plaster	718 Tons	38,908	7,[illegible]
5.	Dens-Cote Base (all)	3,821.6 M.Sq.Ft.	161,387	63,921
6.	Dens-Cote Tape	6,462 Rolls	6,305	2,672
7.	1½" Drywall Screws	872 Gross	2,321	305
8.	Ready Mix Joint Compound	2,414 Pails	11,008	1,617
9.	Water Resistant Board	23,700 Sq. Ft.	1,684	1,046
10.	Model Densite	1 Ton	35	14
11.	High Expansion Densite	.7 Ton	31	7
			$314,894	$104,776

*Obtained from Paoli machine accounting records.

PATENT INFORMATION

Patents Issued - None

Patent Applications Prepared -- Dens-Cote Plaster
Dens-Cote Base

Patents Applied For - None

Patent Applications Previously Submitted -- Processing of Synthetic Gyp[illegible]
One Day Joint Compound
Grabit Adhesive

PROJECTS COMPLETED

1. READY MIX JOINT COMPOUND - R & D 211

Objectives To develop a ready mixed or paste type joint compound to be competitive with other similar products on the market.

Investigation: About two years ago, a basic ready mix formula was developed and successfully field tested. At that time, it was decided that the product would not be put into the line, because (1) the product was not economical due to the freight involved in shipping the pails of ready mix to the potentially good markets; the freight involved in shipping the dry premix from Acme to other plants for conversion to the paste compound; and the relatively high cost of the formula. (2) The questionable market potential. Surveys indicate that the demand was spotty and confined to a few areas which would be least economical for us to ship. (3) The relatively large investment required for equipment to mix, fill pails, store and transfer emulsion, and provide storage for raw materials and finished products.

The second phase of this investigation was begun because of renewed interest from certain parties in Sales, a second basic joint system plant put on stream at Akron, and our own realization that ready mix was becoming a product we would have to reckon with sooner or later. In order to overcome the necessity to purchase large tanks and provide warm storage for binder (PVA emulsion), a ready mix formula which contained a dry binder was developed. This formula cost was also high, but it did circumvent the large equipment expenditure. A small facility was set up at Akron to furnish the requirements of a large high-rise job. The job never materialized; the ready mix froze and thawed several times during the subsequent winter; and it was obvious that the area serviced by Akron was not a good ready mix market, in view of the meager sales.

In spite of this bad taste from ready mix, it had become apparent that ready mix was the preferred joint system in some markets. It is becoming a factor in other markets and is being used for touchup and by "do-it-yourselfers" even in the areas where other joint system products are preferred. Our previously expanding joint system business has leveled off the past two years, and it is felt that lack of a ready mix product has been one cause. It was decided that ready mix should be available from Acme, Akron, Brunswick, Fort Dodge, and Wilmington. This constituted the third phase of the ready mix investigation.

Result: Brunswick and Fort Dodge have already been put into operation, and Akron is continuing to furnish their own requirements as well as supplying Wilmington. Based on the performance of these operations, the other facilities at Acme and Wilmington will be installed. The cost of the equipment including mixer, lid closer, pail filling ram & pump, accessories and installation of the equipment is about $6000 per plant. The pail filling device which is rather inexpensive has improved the capacity of these installations. Some economies in the formula have also been realized, so that the ready mix operation should be more profitable

than originally expected. We returned to the emulsion binder, in view of its lower cost and also because it gave a better end product than the dry resin binder. If the volume can justify the purchase of emulsion in large quantities, a further savings of up to 20¢/pail can be realized. A photograph of a 5-gallon pail of ready mix is shown below:



PROJECTS NEARING COMPLETION

1. JOINT SYSTEM TEXTURES - R & D 261

Objective: To develop pre-aggregated textures for spray application. Specifically, these textures are:

1. Simulated Acoustic (coarse aggregate)
2. Sand Finish (fine aggregate)
3. Masonry (coarse aggregate with rust inhibition properties)

A further object is to develop textures that can be used over surfaces where One Day Joint Compound has been used for the joint finishing, without the necessity of first using a primer.

Investigation: The three products listed above were developed to the trial stage sometime ago. This was during the reorganization of the Sales Department, and the trials never materialized. In some instances the material was lost or used and never reported on. Additional trials were requested, and these were slow to be scheduled. In desperation, it was decided to make these textures available in the area served by the Fort Dodge plant. A quantity of each of the various textures, including a plain (non-aggregated) texture designed to cover One Day without a primer, was shipped to Fort Dodge. Wherever possible, the trials were witnessed by Laboratory personnel. The trials provided some differing opinions but, in general, some unfavorable characteristics prevented their acceptance. These were:

1. When dry, the textures developed a sheen that made the ceilings appear blotchy under severe lighting conditions.

2. The textures would build up locally instead of flattening out as they were applied. This was not too detrimental for the simulated acoustic but caused the sand finish to be coarser than desired.

3. The plain texture covered the One Day satisfactorily in some cases but not in others, so it also failed to achieve our expectations.

On the basis of this experience, it was decided to return all of this texture to Akron and rerun it at a later date. The texture project was brought back to the experimental stage, and means were sought to overcome the objections. It became evident at this time that we should develop the basic textures needed for addition to the line, without regard to their ability to cover applications of One Day Joint System.

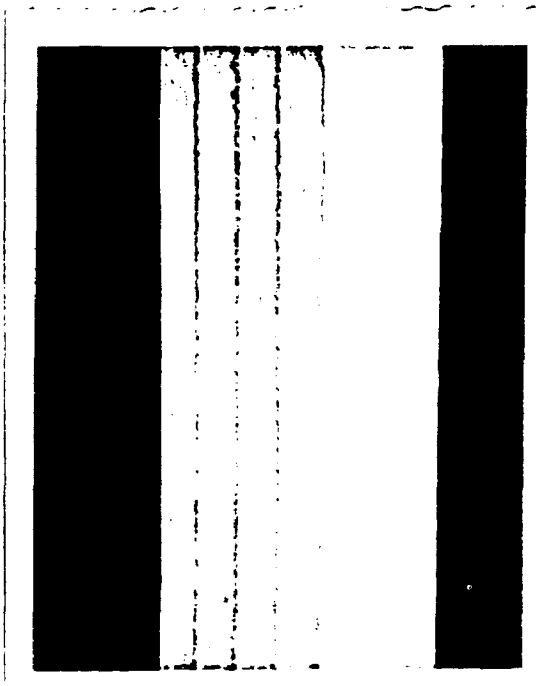
After reformulating the products on this basis, some trials were conducted in the Brunswick area. The trial of masonry texture did not materialize, but the sand finish and simulated acoustic products were found to be satisfactory and overcame the previous objections. The field testing will be continued with additional trials in Kansas City and Hartford, Conn. Trials previously conducted at these locations drew unfavorable comments, so this will confirm whether the necessary corrections to the formula have been made. If these trials are successful, we will consider

approving the two products for release. As yet, insufficient trials of the masonry texture have been conducted to determine whether this product is going to be acceptable.

2. HUMMER SYSTEM - R & D 209

Objective: To develop improved laminated gypsum ribs for Hummer partition systems.

Investigation: It was previously reported that a 2½" thick x 3" wide rib had been developed, and field trials were being requested. After some futile attempts to have trial partitions constructed with these ribs, one was finally found in Washington, D. C. for approximately 100 linear ft. of partition. The advantages brought out in this trial were (1) the ease of installing electrical facilities, and (2) the increased stiffness of this partition. Concurrent with this development, Mr. Hummer modified the installation procedures for the Hummer "B" System, so that the ribs could be set in metal U channels similar to the manner metal studs are set in place before the faces are applied. The new rib and the improved method of installation should overcome all of the advantages previously held by metal stud systems. The next phase is to have one large trial job completed with the new ribs, so a more thorough evaluation will be possible. A picture of the new rib is shown below:



We believe that if the face layer of 5/8" Firestop can be held in place longer, there will be a good chance of making the 2 hours. On this basis, the large scale test was recommended. Certain changes in fastening will be made to hold the face layer on longer. The AFE has been approved, and the construction and test are scheduled for late July or early August.

7. DRY VINYL TOPPING COMPOUND - R & D 211

Objective: To formulate a topping compound with a vinyl binder instead of a casein binder. It is intended that the vinyl topping will be a superior product.

Investigation: The investigation was originally directed to the development of a dry vinyl joint compound. Bonding difficulties at low temperatures caused us to direct our efforts to a topping compound, in which the bond is less critical. The advantages of a vinyl formula are:

1. Longer wet life, since it is not subject to putrefaction to the extent that casein topping is.

2. Offers better control from the plant standpoint because of simpler formula and more uniformity of the binder.

3. Requires less mixing water so there is less shrinkage.

4. Offers better working properties than its casein counterpart.

5. Is compatible with One Day, whereas casein topping is not.

Field trials of the vinyl topping were conducted in Nashville, Tenn. and Hartford, Conn. The comments were favorable, and its performance was satisfactory. Also, this product was used for some of the joint finishing in the Laboratory during the renovation of the building. Most applicators commented that it worked like ready mix. It was hoped that the vinyl formula would not be significantly higher in cost than regular topping, but this did not prove to be the case. The vinyl topping has a raw material cost of $84/ton as opposed to $65/ton for the regular topping. In view of the advantages of this topping, the Laboratory will propose that the product be released and sold at a premium price.

8. SYNTHETIC GYPSUM - R & D 221

Objective: To confirm the results of the initial trial run which indicated that synthetic gypsum could be successfully utilized for wallboard and plaster manufacture. This process involves conversion of the synthetic gypsum by product of the manufacture of phosphroic acid to a useable form.

Investigation: The basic operations of this conversion process for which a patent has been applied are as follows:

1. Drying of the synthetic gypsum as received. The latest shipment contained 20% free water.

9. GYPSUM ACOUSTICAL TILE - R & D 274

Objective: To develop a gypsum acoustical tile using the resin reinforced foam idea.

Investigation: Some previous work directed toward the development of a lightweight board confirmed a theory regarding the reinforced foams. The theory is that a foam cell containing some resin or other reinforcing material surrounding the cell will act as an aggregate in a gypsum matrix. This would provide greater strength than normally expected of a foam gypsum structure. This theory was confirmed, but the economics of its use in board were not favorable. It was felt that this theory might be applied to a product for which the additional cost could be justified. With the knowledge that acoustical tile, particularly when fire rated, sells for 15 - 25¢ per sq. ft., some exploratory work was done. Sample 2' x 2' tiles at 15 - 17 lbs/cu. ft. density were made, using reinforced foam and glass fibers to provide sufficient compressive and transverse strength. Sound absorption tests conducted by an outside laboratory indicate that our product is just about as good acoustically as Armstrong's 2 hour rated Fire-Gard tile. A fire test in our small scale furnace indicates that it performs better than either our Firestop 120 or Armstrong's Fire-Gard, both of which have 2 hour ratings. The estimated raw material cost, excluding paint, is 4¢ per square foot for 3/4" thickness, allowing 25% for waste.

This acoustical tile appears to offer good potential and when presented to Sales, it was suggested that we assign a project to proceed with its development. This all occurred during the building renovation, and there was no space to set up for casting full size slabs. As soon as the new building is ready, the necessary foaming, mixing and casting equipment will be installed. In the meantime, our old Standing Wave equipment for testing sound absorption has been sent out for repair so that it can be used to test the sample tiles which will eventually be made.

10. PROTEIN JOINT COMPOUND FORMULATIONS - R & D 275

Objective: To make improvements where advisable or necessary to our Joint System products.

Investigation: A water retention agent from the hydroxyethylcellulose family has been found which offers improved qualities and cost savings for our line of Joint System products. This product, called Natrosol, will be used as a substitute for Kelsize, which is a Kelp product. In conjunction with this substitution, one of the preservatives will be eliminated. This preservative was necessary because of the degenerative effects of the Kelsize.

The improvements in quality expected are:

1. Easier mixing
2. Better working
3. Greater insurance against staining problems which stem from preservatives.

The savings vary with the formula, but based on the last six months' sales, the anticipated annual savings would be $22,300.

The savings do not include ready mix in which we have already incorporated Natrosol. A slow changeover to Natrosol in all products is already underway and should be completed by the end of the year.

11. SOUND RATED CONSTRUCTIONS - R & D 276

Objective: To conduct a sound test program to establish sound ratings for various partition and floor & ceiling assemblies. Most of this is being done at Donn Products' Ohio Research facilities.

Investigation: A rather complete group of sound ratings has been attained with sound transmission Class (STC) values of 50 or better for wood stud, metal stud, and laminated gypsum partition constructions. Other partitions of each type attained ratings in the 45 - 50 STC range. Two new constructions were originated in the course of the testing. One is a metal stud partition with an STC of 52 and the other is a 2½" x 3" gypsum stud partition with an STC of 50. These can be promoted as firsts for Bestwall.

All of the data recently developed is being put into shape for distribution to the trade and to our sales people. Some further tests are planned, and this data will be added at a later date. Our problem in dispersing this information will be to present it in such a manner that it will be understood by all. On the basis of some of the sound ratings obtained, fire tests will be proposed for identical constructions. It is felt that sound and fire ratings go hand in hand, and wherever one is needed, so is the other.

12. DIMENSIONAL CHANGE OF GYPSUM PRODUCTS AT HIGH TEMPERATURES - R & D 277

Objective: To measure the dimensional changes which occur in gypsum products at temperatures up to 2000°F. and assess the significance of the data obtained. A Gaertner Dilatometer was purchased to make these determinations.

Investigation: Our initial work will involve fire rated board with the idea that we may be able to predict what happens to this board in an actual fire test. During the calibration of the instrument, the element burned out, so it has been returned for repair.

13. COOPERATIVE RESEARCH PROGRAM WITH JOHNS-MANVILLE - R & D 278

Objective: To enter into such cooperative ventures as are considered to be of interest to both companies. The first venture agreed upon is a fire test of Soundike-Firestop installation.

SUMMARY

The highlights of the Research Acitivities for the past six months have been:

1. The introduction of a ready mix joint compound;
2. The development of a water resistant wallboard;
3. The second successful trial in the manufacturing of wallboard from synthetic gypsum;
4. The 2 and 3 hour fire ratings for columns;
5. The 2-hour rating for the Firestop 120 Ceiling with light & vent openings;
6. The 1½ hour rating for the concrete ceiling with 1/2" Firestop underneath; and
7. The sound test data attained thus far for the various partitions tested.

Our efforts in certain areas have been retarded, since our shop facilities were removed during the renovation of the building. These facilities will be restored in the new building which is under construction. The installation of certain new equipment, the remodeling of some of the old equipment, and the additional space available will enhance our ability to provide information and conduct project investigations.

Our present plans for the last half of 1964 call for:

1. The continuation of our fire and sound testing program;
2. Attempts to complete the aggregated textures, new grainboard, and industrial gypsum product development;
3. The pursuit of potential cost savings in conjunction with the finer filament glass fiber and new water retention agent for joint system; and
4. Embarking on new projects such as the development of a gypsum acoustical tile.

It is also hoped that we can devote a certain amount of time to the search for knowledge, which is not necessarily directed to present objectives but which may serve as a basis for future developments.