

BESTWALL GYPSUM COMPANY

R&D REPORT FOR 6 MONTH PERIOD ENDING DECEMBER 31, 1964

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SGP 0015321

FOREWORD

This is a report of the activities of the Research Department for the last six months of 1964. During this period there were no personnel changes in the department. The major change which did take place was the restoration of the Research & Development test facilities in a new building. Our large scale testing facilities had been removed during the consolidation of Bestwall's general offices in Paoli. In the new building, better equipment and more space have been provided for us to perform our function.

The 1964 expenditure is estimated by the Cost Department at \$133,880 as opposed to the figure of \$150,000 which had been projected for 1964. In 1965, more reliable figures will be available because of the new accounting system which will be in effect. A better analysis of research expenses will therefore be possible. With the information available this year, the chart on the following page was prepared and shows the approximate distribution of research costs in 1964.

Also included in this report is a record of the market performance of products which have resulted from the efforts of the Research Department. There is no sure method of evaluating certain accomplishments, such as fire rated constructions or sound rated constructions which were developed to provide assistance to Sales. The fact that our sales of 1/2" Firestop are up 48.7% in 1964 and our sales of 5/8" Firestop are up 34.2% in 1964 over 1963, are indications that we are reaping some benefits from this work.

This report is divided into three sections:

Projects Completed
Projects Nearing Completion
Projects Underway

These sections appear in the order named and indicate the progress to date for the projects within each section.

*1964 MARKET PERFORMANCE OF NEW PRODUCTS

<u>PRODUCT</u>	<u>SALES VOLUME</u>	
	<u>Last 6 Mos</u>	<u>Year</u>
FIRESTOP 120	251 M sq. ft.	557 M sq. ft.
GRABIT ADHESIVE	53 T	75 T
ONE DAY JOINT COMPOUND	284 T	548 T
DENS-COTE PLASTER	911 T	1,629 T
DENS-COTE BASE	4,952 M sq. ft.	8,774 M sq. ft.
DENS-COTE TAPE	7,302 rolls	13,764 rolls
READY MIX	13,203 cans	15,617 cans
TILE BACKER BOARD	321 M sq. ft.	345 M sq. ft.
TILE BACKER TAPE	139 rolls	139 rolls
MODEL DENSITE	4.5 T	4.5 T
TOOLING DENSITE	0.8 T	0.8 T
HIGH EXPANSION DENSITE	2.1 T	2.1 T
BESTEX "C"	527 bags	527 bags

TOTAL

PATENT INFORMATION

Patents Issued - None

Patents Applied For - None

Patent applications previously submitted:

Processing of Synthetic Gypsum

One Day Joint Compound

Grabit Adhesive

Dens-Cote Plaster

Dens-Cote Base

MILL BASE SALES		ESTIMATED GROSS PROFIT	
<u>Last 6 Mos</u>	<u>Year</u>	<u>Last 6 Mos</u>	<u>Year</u>
\$ 34,380	\$ 76,751	\$ 9,875	\$ 22,432
10,048	14,259	5,778	8,181
45,826	92,459	11,862	24,346
49,124	88,032	8,478	16,228
209,280	370,667	79,988	143,909
7,465	13,770	3,129	5,801
57,488	68,496	8,662	10,279
25,058	26,742	9,344	10,390
1,273	1,273	769	769
158	158	63	63
41	41	14	14
99	99	25	25
<u>2,848</u>	<u>2,848</u>	<u>1,018</u>	<u>1,018</u>
443,088	755,595	139,005	243,455

*Cost figures computed by the Financial Department from the machine accounting records.

PROJECTS NEARING COMPLETION

1. JOINT SYSTEM TEXTURES * R&D #261

Objective: To develop a complete line of textures suitable for spray application.

Investigation: Earlier field trials of a formula in the Fort Dodge market were unfavorable. It was found that the texture, when applied & dry, had a sheen which under certain types of light appeared like shiny spots on the ceiling. This was overcome with a revised formula, and a series of trials in the Brunswick area and elsewhere were conducted. These trials were moderately successful, but the texture still lacked adequate hiding properties. It was found that the texture as applied piled up in local areas instead of flattening out and resulted in small areas which were not covered by texture. The necessary formula revisions were made, and another series of trials were conducted. This time we returned to Kansas City, where some of the earlier unsatisfactory trials were held. The simulated acoustic texture was given the most attention, since this type is the most popular. Field trials of the simulated acoustic texture have all been quite favorable, and it has been released under the trade name of Bestex C. Other proposed products for the spray texture line are currently undergoing field performance trials. These are:

Bestex A - Non-aggregated texture for spray application. This texture is often applied to walls when one of the other textures is used on the ceiling.

Bestex B - Sand finish type texture for contractors who prefer a lighter texture.

Bestex D - Coarse, rust inhibiting texture for direct application to concrete slab ceilings.

A great deal has been learned in the course of this investigation which adds to our experience in the application of decorative materials. If the current field testing meets our expectations, the Bestex A, B, & D should be released within the next few months.

2. NEW TYPE OF GLASS FIBER - R&D #131

Objective: Evaluate Owens-Corning's fine filament 636 glass fiber for use in our wallboard products.

Investigation: The 636 glass fiber consists of .00026" diameter filaments. This compares to 710 fiber which has .00040" filaments and 799 fiber which is a mixture of the two filament sizes. There are twice as many individual filaments per pound of 636 glass fiber than there are of 710 glass fiber. This

PROJECTS UNDERWAY

1. RAM PROCESS PLASTER - R&D #132

Objective: To develop a special pottery plaster for use in ram pottery making process. One of the requirements for the product is that the molds can be purged of excess water with air at 120 p.s.i.

Investigation: This project has been marked with a number of unsuccessful attempts to produce an acceptable product. Another experimental formula was tried at Phaltzgraff Pottery in York, just recently, and again our product did not quite pass the requirements, as it was unable to withstand the 120 p.s.i. purging for the full 15 minutes. This is a test used by the pottery people to be sure the castings will not explode and injure someone while they are in actual use. The casts made with our material withstood the purging for only a few seconds at 120 p.s.i. This is the closest we have ever gotten to a successful product, and it is believed that further efforts are justified, since we are so close to having an acceptable product. It is our understanding that the volume of ram process plaster and particularly the regular pottery plaster sold along with it is substantial.

2. VINYL JOINT COMPOUNDS - R&D #211

Objective: To develop joint system products with vinyl binders instead of casein binders.

Investigation: This has been under investigation for some time, but the economics has always favored the protein binders. Also the inability of obtaining an adequate bond at low temperatures (below 45°F.) with the vinyl products has slowed the progress. A vinyl base topping compound was developed, but when presented to Sales their survey showed little interest in this product, particularly in view of the premium price we would have to ask for it. This work has recently been intensified, in view of the price instability of casein and the present sharply higher casein prices. Our objective is a vinyl base joint compound (for taping & finishing) which can be sold at the same price as the casein counterpart. This product can also be used as a finishing material over One Day Joint Compound, if we are successful. We have experienced some incompatibility problems in using our present products to finish over One Day joint system.

3. PREPARED TROWEL FINISH PLASTER - R&D #228

Objective: To develop a finish plaster which can be used in lieu of the conventional lime-putty finish. USG is presently supplying a product in the Houston market, so the chief purpose of this product is to meet that competitive situation.

small acoustical tile specimens of various formulations were made. The Standing Wave tester was repaired so that specimens could be compared acoustically with tiles of known sound absorption properties by comparing normal incidence sound absorption values. It was found that an inter-connecting cell structure was possible, and this, of course, gave better sound absorption. The 7/8" thick tile samples compare favorably with competitive acoustical tile having an NRC of 65-75. Painting the surface of these tile samples with a non-bridging paint does not change the absorption. A cast density of 16-18 lbs/cubic foot has been used thus far. A study of the effect of density, the effect of different resins, and the effect of 1" glass fiber will be the next steps in the tile project. Following the establishment of a preliminary formula, a fire endurance test in our small furnace and an absorption test at a recognized acoustical testing laboratory will be recommended. We are shooting for a 2 hour fire rated lay-in tile with an NRC of 70 or better. Raw material costs of this proposed tile should be less than 4¢ per square foot 1" thick. No estimate of manufacturing costs has been made as yet. It does, however, appear that the economics can be favorable, in view of the selling price of more than 20¢/sq. ft. for this type of tile (Armstrong's 2 hour rated Fire-Gard).

6. PROTEIN JOINT COMPOUND FORMULATIONS - R&D #275

Objective: To make revisions or improvements where advisable in our Joint System product formulations.

Investigation: Previous work consisted mainly of the substitution of hydroxyethyl cellulose for alginate as the water retention agent in joint system, and the testing of a new alkali system which consists of soda ash and borax. The hydroxyethyl cellulose (Hercule's Natrosol) offers improved mixing & application properties, and the borax provides quicker solution of the casein and a more efficient binder system. In the old formulas, borax was not compatible with the alginates, so its use was dependent on our ability to use Natrosol as the water retention agent. Other hydroxyethyl cellulose products had been tried in the past, but their hygroscopicity always prevented successful use. This adverse characteristic has been overcome in Natrosol.

Even before this work was completely finished, a casein shortage developed, and the price of casein began to skyrocket. Starting at 19¢/lb. in December, the price will reach 36¢/lb. by March. Because of this, we were directed to intensify the work being done and to start a search for binder substitutes for casein. Since the new alkali system offers a quicker method of reducing cost by reducing casein content, it will be given first priority. The other approach involving binder substitutes and binder combinations has also been started, but this is a longer range program and will be given secondary attention.

Investigation: The details of the construction have been worked out, and the test has been arranged to be run at Ohio State. All of the materials are at Ohio State, so this partition can be tested as soon as we can get on the schedule.

12. PRECOATING OF GYPSUM WALLBOARD - R&D #286

Objective: Apply a coating of joint system material to the surface of the wallboard as an in-process operation.

Investigation: It was found that a thin uniform layer of joint compound could be spray applied over a wallboard surface. In certain cases, the area of the wallboard is given a coating of joint material as the last step in its installation and before painting. This operation was initiated by Mr. E. B. Hummer, and its prime purpose was to bring the surface textures of the wallboard & the surface covering of the joints, nailheads, etc. closer together. In other words, the shear coat provides a more nearly monolithic surface. Other advantages to be gained, from our standpoint, are that more paper defects could be tolerated - and perhaps a lower cost (grayback instead of ivory) paper could be used. The major problem is how to apply such a coating in the proper thickness and sufficient uniformity in our manufacturing process. However, before that stage is reached, a more precise appraisal of the coating and any problems it may present must be assessed. We are in the very early stages of this investigation and, at the moment, our attention has been diverted to other projects of higher priority.

13. READY MIX JOINT COMPOUND - R&D #211

Objective: Reduce the formula cost of our Ready Mix, in order to improve the profit on this item.

Investigation: A comparison of Bestwall Ready Mix vs. ESG and other competitive products revealed that the competitive products have lighter weight pails. A difference of about 4 lbs/5 gallon pail was found. In exploring this, it was found that substitution of 3% highly absorbent Attagel Clay for 10% Kaolin Clay reduced the pail weight by $4\frac{1}{2}$ lbs. In the process, more water is required; and the net result is a 10% reduction in raw material usage. A series of tests is underway to evaluate this new formula, and indications thus far are that some quality advantages will be gained in addition to the improvement in Economics.

S U M M A R Y

The last 6 months in the Research Department have been highlighted by the reinstallation of our large-scale testing equipment in a new building, which was provided for that purpose. The major accomplishments during this 6-month period were:

1. The first 2-hour fire rated wood floor & ceiling assembly was granted to Bestwall, from our successful test of this construction at Underwriters' Laboratories.
2. The first 1-hour rated wood stud partition with 1 layer of fiberboard and 1 layer of 5/8" Firestop was achieved as a result of another successful test; this time at Ohio State University.
3. A sound test program was completed which gives us a full range of sound transmission class (STC) values, to promote wood stud, metal stud, and gypsum partitions.
4. A new line of striated wood grain products has been readied for release early in 1965.
5. A vastly improved high expansion plaster has been developed and added to our industrial product line.
6. A series of particle size analyses has been completed recently. This study has provided our first knowledge of the particle size & gradation of our materials in the subsieve (finer than 44 micron) range. This is the start of a build-up of information that can be a basis for future developments.

Having our equipment restored and some newer facilities which we did not have available previously, will enhance our ability to undertake developments and furnish information that can serve as a basis for the immediate & future growth of Bestwall Gypsum Company. A budget for next year in the amount of \$170,000 was prepared. This includes \$60,000 for new fire & sound test programs, as well as continuing our present programs on the same basis as last year. Also, allowance has been made for the addition of one new man to the Research Department staff.

The present plans for early 1965 call for the following work to be undertaken:

1. A large scale run of synthetic gypsum which will provide the final basis for deciding the future use of this process development.
2. The release of a full line of spray textures.
3. An extensive exploratory fire test program using our small furnace and the subsequent scheduling of large scale tests at U. L. and Ohio State based on our findings.

4. The reduction of the glass fiber usage in regular wallboard based on experience with the finer filament glass fiber.
5. The pursuit of a cost reduction program in the joint system product line, by means of formula revision.
6. The search for new binders to supplant casein in joint system products.
7. The development of comparative information on a dozen different thincoat plaster products which have been submitted.

Projects absent from the present schedule are the particle size studies, the gypsum acoustical tile, the pre-coating of gypsum board, and other more basic work. It is our fervent desire to pursue this work, as soon as time can be spared from areas of higher priority. These higher priority items are of more immediate significance to the Company, but spending our entire effort here completely ignores the projects which protect our future. It is our opinion that the longer term projects, when successful, result in far greater potential than the projects designed to fulfill immediate needs. It is our hope that a program encompassing both the immediate & future needs of the Company will be possible.

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

<u>PRODUCT</u>	<u>SALES VOLUME</u>	<u>MILL BASE SALES</u>	<u>ESTIMATE GROSS PWT</u>
1. Firestop 120 Ceiling Tile	306,000 sq.ft.	\$ 42,371	\$ 12,555
2. "Grabit" Masonry Adhesive	22 Tons	4,211	2,403
3. One Day Joint Compound	264 Tons	46,633	12,484
4. Dens-Cote Plaster	718 Tons	38,908	7,750
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	<u>31</u>	<u>7</u>
		\$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
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.

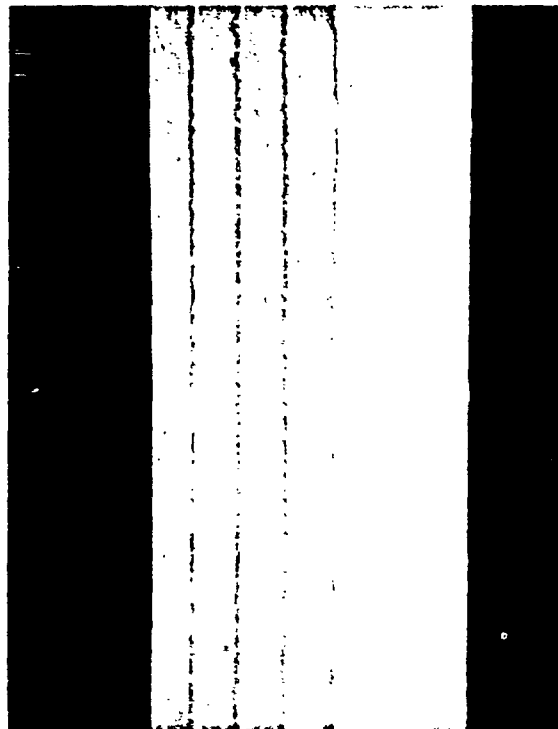
After reformulating the products on this basis, some trials were conducted in the Brunswick area. The trial of masonry texture did not materialize, but the sand finish and simulated acoustic products were found to be satisfactory and overcame the previous objections. The field testing will be continued 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 $2\frac{1}{2}$ " 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 phosphoric 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 hydroxyethyl-cellulose 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 Activities 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.