PLAINTIFF'S EXHIBIT

GP-760

RESEARCH AND DEVELOPMENT
SIX MONTH REPORT

January through June 1972

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SIX MONTH SUMMARY

This report covers the activities of the Research and Development Department for the six month period ending June 30, 1972. Effective April 1, the responsibilities of Research were expanded to include certain functions of the old Technical Department. The functions retained are those dealing with plant assistance. The quality responsibilities will be handled by the Operations Department, and we will only become involved at their request. It is anticipated that approximately 20% of our effort will be directed to Manufacturing services. The six months reporting will now be divided into six separate sections to cover new products, product improvements, services to Sales, services to Manufacturing, patents and licensing, and other general project assignments not covered by those previously mentioned.

On page 4 is a list of the new products developed through research during the past five years. Previously all past new product developments had been reported, but we feel that the five-year period is sufficient to cover the recent developments. Sales of $1,136,958 and profits of $284,149 were generated from these new products. We have also begun to estimate cost savings from R & D activities, since a significant part of our efforts are in that direction. The first half cost savings totaled $49,194 as a direct result of R & D programs.

New Products:

The major new product developments currently under investigation are (1) non-rosette Pre-Dec, (2) panel adhesive, and (3) polystyrene texture. The non-rosette Pre-Dec was given a top priority by Sales since it was anticipated that, if it were successful, it would substantially increase our Pre-Dec sales. A non-rosette system has been developed and is ready for sales evaluation. The development of a water-base panel adhesive has progressed to the point where it also is ready for field testing. If the field trials are successful, we plan to reactivate the Tigard Adhesive Department in order to market test the panel adhesive. Field tests on polystyrene texture are underway, and the initial reports are encouraging. We will market test in the northwest and field test in other areas.

Product Improvements:

The major projects in this category were those directed at improving our joint system and texture product lines. The rapid

escalation in the price of casein has been a major reason for concentrated activity in the joint systems. Several different binders are being considered as replacements for casein. At Acme we have already made a change from casein to vinyl binders. The results of this change can be seen by comparing the sales and profits at Acme for the first six months of 1971 and 1972. They are shown on page 4. At Akron and Chicago, a polyacrylamide resin manufactured by Dow Chemical Company has shown the most promise as a replacement for casein. Marietta is manufacturing very little dry joint system, so the high cost of casein there is not as critical as it is at the other plants. The transition away from casein should be completed before the end of 1972, preserving the profitability of our joint system line and perhaps giving us an edge on our competition.

Our textures have now been completely revamped. The new formulas not only eliminate casein, but in the ceiling textures we have also eliminated asbestos. This reformulation has made our textures more acceptable and has restored their profitability. Savings of about $.80 per 40 lb. bag are being realized.

A temporary shortage of asbestos necessitated a crash program to find some alternate sources for this raw material which is used in practically all our joint system products. We were successful in finding alternate sources which prevented loss of sales. We have a continuing program to eliminate asbestos from all joint system and texture formulas since asbestos is classified as a hazardous material by OSHA.

Sales Services:

The main project conducted for Sales was the continued development of the G-P shaft wall system. A variation of our basic shaft wall was tested to provide better resistance to sound transmission. This version of our shaft wall will also be fire tested to achieve a two-hour fire rating from each side. If all the tests are successful, we should have the most complete shaft wall system available. Another Sales request was to cooperate with T.S.G. Industries who are developing a house consisting of sections poured from mixtures of Denscal and Portland cement. This is a new approach to the housing industry and may not be practical, but we cannot afford to dismiss it in view of the large quantities of gypsum which would be used.

Late last year a 25 flamespread rating was obtained for Eternawall. The six month sales or Eternawall were up 45% over the same period last year and we assume achieving the 25 flamespread was a factor in making this increase possible.

SIX MONTHS MARKET PERFORMANCE OF *NEW PRODUCTS

Unit	Product	Volume	Sales Amount	Profit Amount
MSF	Radiant Heat Panels (all)	44	$ 17,445	$(593)
MSF	1/4" Sound Deadening Board	3,481	129,240	35,996
MSF	Pre-Dec Wallboard (all)	17,551	978,574	245,837
Tubes	Drywall Adhesive	6,876	4,014	(97)
MSF	Shaft Liner Panels	17	3,409	1,086
Tons	Ram Press Process Plaster	43	4,276	1,920
MLF	Metal T Splines	-	-	-
MLF	Metal L Runner & J Channels	-	-	-
TOTALS			$1,136,958	$ 284,149

*Developed during the past 5 years

SIX MONTHS COST SAVINGS REPORT

Acme Joint System	Sales	Profits
	1972 - $401,675	1972 - $76,089
	1971 - 386,602	1971 - 44,555
	Gain - $ 15,073	$31,534

Acme Texture	Sales	Profits
	1972 - $41,261	1972 - $10,238
	1971 - 25,310	1971 - 322
	Gain - $15,951	$ 9,916

Total Joint System & Texture Savings - $41,450

Fort Dodge Laminating Adhesive	Vinyl	Foil
Raw Material Savings -	$2,579	$(14)
Coverage Savings -	2,750	$2,429
Six Months Cost Savings -	$5,329	$2,415

Total Adhesive Savings - $7,744

NEW PRODUCT SECTION

Drywall Adhesive

About 3000 cases of drywall adhesive (twelve 30 oz. tubes/case) were manufactured at Tigard and are being sold to various branches in the northwest. About 2000 cases were manufactured from the old adhesive which had been reworked. The sales of the reworked adhesive were credited to the Akron plant since they had been saddled with the loss from the adhesive which was shipped to the northwest. Akron also had a supply of the old adhesive. Most of this was reworked into 1200 cases of drywall adhesive. Field trials of the drywall adhesive were very successful and marketing was commenced. The sale of the adhesive has developed slowly in spite of the good acceptance. Of the adhesive manufactured in January and February, there are about 700 cases left in Tigard and 600 cases in Akron.

Panel Adhesive

The Distribution Division currently sells over one million tubes of panel adhesive per year. This adhesive must develop tack quickly so that few, if any, fasteners are required. There was some question whether fast tacking properties could be incorporated in a water base adhesive. The control was the adhesive manufactured by Continental Chemical and sold through the Distribution Division. This product is one of the fastest tacking solvent adhesives on the market so it represented quite a challenge. A formula has been developed which comes very close to Continental in quick tacking properties. It has been screened through the distribution product manager. Several cases (24 pint tubes/case) were prepared and we are currently waiting for field trials to be arranged. If field trials are favorable, Tigard Adhesive may be reactivated to manufacture and market test the water base panel adhesive in the northwest. The next step would be to install an adhesive manufacturing operation that could distribute nationally through our branch organization.

Gypsum Firedoor

The gypsum firedoor was tested at Underwriters' in February in a second attempt to pass the one-hour fire and hose stream test. The fire test was successful but the hose stream test failed again, this time by a significant margin. The burnout of the treated wood on the jamb side along with the erosion of the core caused the failure. After this test it was decided to abandon the project.

(Transamerica Corp.) became alarmed at the worsening condition of the houses. An investigation is currently being made to ascertain the cause and pinpoint the responsibility.

In spite of this failure, the gypsum board may still have a future for exterior application if a better means can be found to reinforce the joints. Some panels were built and tested using Speed Set and glass fiber tape for the joint reinforcing prior to the application of the acrylic surfacing. The panels were racked to failure and no beading or cracking occurred so this mathod may have merit. The system will be applied to two exterior walls of our test module for exposure testing.

Polystyrene Texture

A newly developed texture contains a polystyrene aggergate and is used for ceilings. The equipment to expand and shred polystyrene was installed in the Acme modernization. The preliminary field trials have been favorable. The polystyrene texture is more acceptable in certain markets because of its ease of application and whiter appearance than the vermiculite textures.

IMPROVED PRODUCT SECTION

Textures

The reformulation of the coarse (vermiculite aggregate), medium (vermiculite aggregate), and fine (perlite aggregate) ceiling textures is now complete. The question of low versus high pressure has been resolved so the textures can be applied through both high and low pressure spray rigs. The raw material cost savings averaged $.80 per 40 lb. bag. These savings in addition to the operational savings made possible by the plant improvements at Acme significantly increased the profitability of our ceiling textures. In addition, the asbestos has been eliminated from these formulas, making them ecologically more acceptable.

The wall texture (no aggregate) has also been reformulated to eliminate the casein and make it more economical. Raw material costs have been reduced $.32 per 25 lb. bag. We have not been able to entirely eliminate asbestos but have reduced it. Field tests of this formula have been requested to confirm the lab testing.

Joint System Products

a. Casein Replacement

The shortage of casein and the subsequent rise in the price from about $.30 per pound to a high of $.72 per pound prompted us to seek a substitute binder. Casein has been the standard in joint system products starting in the 1940's and it became apparent that finding a satisfactory substitute would not be easy.

Vinyl Binders: We have already gone through a change from casein/limestone to vinyl/gypsum at Acme. In this case, the price of the limestone as well as the casein forced the change. The vinyl binder is not entirely satisfactory because it is not compatible with casein products which are still being marketed and there is a difference in the application properties.

Starch Binders: Certain modified starches were tried as binder substitutes for casein. Although there was some acceptance, it was not universal. Also, some quality problems developed as a result of variations in starch. We are still marketing some starch products, but on a very limited basis.

Polyacrylamide: During the past eight months, a product manufactured by Dow Chemical Company has been undergoing evaluation.

This program was stepped up as the shortage of casein became more acute and because early trials were encouraging. This binder, called Dow 164 Resin, was compatible with casein and imparted much the same working characteristics as the casein. A plan to gradually phase casein out at Chicago, Akron, and Marietta is in effect. This plan is to coincide with the depletion of the inventory of casein for which we are committed. The tentative date to phase out casein is October 1972.

b. Asbestos

Phillip Carey, our chief supplier of asbestos, was unable to ship our orders on time, so another source has to be found quickly. We had been using a small amount of Union Carbide SG-210 in some products so it was a candidate. Also evaluated were two types of asbestos from J-M. The SG-210 was found to be very satisfactory and we are still testing one type from J-M. We have begun using SG-210 in certain products and feel that there is a slight advantage in quality as well as a very small raw material cost saving. The main thing is that we are now more flexible and less dependent on a single asbestos supplier.

Laminating Adhesive for Eternawall

Fort Dodge has been using adhesive formulated at Tigard for their vinyl laminating. In six months there has been $5329 savings. The same adhesive was diluted and used for foil lamination and produced another $2415 savings.

MANUFACTURING SERVICES SECTION

Wallboard, Lath, and Plaster

a. One trip was made to Akron, three to Grand Rapids and one to Buchanan to provide plant assistance. These concerned high T.C. stucco, poor wallboard core quality, analysis of rock deposits, and instruction in the use of the flame photometer.

b. We are continuing to analyze rock or stucco samples for the plants that require periodic analyses. We have discontinued making weekly purity analyses for every plant.

c. A radiant heat panel complaint in Baltimore was investigated.

d. We are continuing to keep the formula books up-to-date for all wallboard, plaster, and industrial formulas.

Joint System

a. We responded to a shortage in our asbestos supply by evaluating some other sources. We were able to expand our use of Union Carbide's SG-210 which makes us less dependent on Phillip Carey as a supplier.

b. A trip was made to Marietta to participate in the discussions concerning a large amount of defective Reichold emulsion that caused quality problems.

c. Heavy duty vinyl bags are being evaluated as Ready Mix containers. The vinyl bags are less costly than the pails and boxes and are easier to fill than the boxes.

PATENTS AND LICENSING SECTION

Firestop

Improved Firestop patent #3,616,173 issued in October 1971 to George Green. This improvement has already been extended to our licensees and will enable us to continue licensing under this patent for another 17 years. The 1/2" fire rated board being licensed, a small amount of the 5/8" fire rated board being licensed, and the 1" component of the U.L. fire rated shaft wall system all fall under the new patent. About 25% of our licensing potential should be retained under this patent. One of our old Firestop patents expired last May and the last one will expire 18 months from now. In order to gain maximum advantage from the new patent, we are reviewing our entire Firestop licensing program to try to establish some consistency in the agreements and, if possible, to upgrade some of our royalty rates.

Shaft Wall System

We have reached agreement with Domtar Construction Materials, Inc., of Canada and will grant them a license under the same royalty terms that Celotex is licensed. Flintkote had been a candidate for a shaft wall license, but they have developed a system of their own. If our shaft wall gains widespread acceptance, we may get other licensees. It is generally accepted that practically all elevator shafts in high rise buildings will have gypsum enclosures in the future. This should be a vast new market for gypsum products considering the average wall will have a 2-5/8" thickness of gypsum. Since our sales contact with architects is limited, it behooves us to license as many companies as we can.

Gypsum Joint System

A snag was encountered in attempting to describe the modified polyvinyl alcohol used with the gypsum filler. Monsanto, the manufacturer of the polyvinyl alcohol, misled us into thinking it would be covered in a patent of theirs. When the patent issued, it did not include the alcohol we are using and they refused to supply a description that would satisfy the patent examiner. This invention covers all of the joint compounds being manufactured at Acme, so it is important to seek patent protection. Our analysis of the modified polyvinyl alcohol has narrowed it to the point where we can have an independent laboratory finish the job. The outside analysis is in progress, and a continuation application was filed to allow enough time to get the information to the patent office.

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