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RESEARCH LABORATORIES

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Report No. 4-51

Date June 2, 1953

REPORT TO THE DIRECTOR OF RESEARCH FROM Rock Wool **LABORATORY**

TITLE: Progress Report: Re-investigate Thermaoustic and Develop Product For Greater Market

REQUESTED BY: W. H. Harding

INVESTIGATION APPROVED BY: W. H. Harding

WHAT IS WANTED: Develop Thermaoustic for a greater market. **A 04808**

WHY WANTED: To promote the development of Thermaoustic.

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Progress Report:

Conclusions

Gold Pond Thermaoustic is equal to or better than competitive products tested in the recent survey. It would be desirable, however, to improve the product by reducing the dust, eliminating the use of a primer, and improving the blowing machine.

Recommendations

It is recommended that the following projects be given separate branch numbers and constitute the program for Thermaoustic development:

1. Determine the ability of product emission primer. If possible, eliminate the use of primer. If not, complete the investigation of other products to reduce product emission.
2. Develop a machine to reduce the dust involved in the spraying operation.
3. Develop a more efficient blowing machine.

Discussion

This project was placed on the research agenda on July 2, 1952, according to the "Request for Research project", dated 5/13/52, by D. G. Stanberg. It has never been initiated due to the lack of clarity and definition of Sales requests. Reported attempts to rectify the situation have produced no tangible results.

Form NC 1292

PENGAD-Bayonne, N. J.

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No work had been done on the project prior to L. H. Fletcher's association with the Company on July 16, 1952. The period from July 16, 1952, to August 16, 1952, can be considered as orientation and indoctrination. During this time, the literature and files were reviewed and a rough draft of a final report on work done by F. H. Stamp was edited and revised. This report has not been issued up to this date.

In lieu of a specific program the period from August 16, 1952, to the present was devoted to more or less general research which is described briefly in chronological order below:

1. Wettability of Type X wool vs. Thermacoustic performance.

It is essential that Thermacoustic be readily wettable to insure the development of maximum bond strength and good coverage. Prior to this study the wettability of Type X wool was thought to be dependent upon its oil content. It was proved, however, that oil content does not necessarily affect wettability. Furthermore, from the standpoint of oil content, it was found that it would be practically impossible for the plant to manufacture Type X wool which would be unsuitable for Thermacoustic on the basis of wettability.

2. White wool for Thermacoustic.

This is item 1 of the specified objectives in Sales' Request for Research Project previously mentioned.

It was found that Sales' requirements could be met by paint rather than a white fiber over-spray. Tests proved that a white paint coat could be applied immediately after the Thermacoustic had been applied without adverse results. It was learned in a visit with C. H. Wall in Philadelphia, that this practice is ordinarily followed by his applicators.

The Product Specification and Product Supplement were revised accordingly.

3. Uniformity of Mixing.

Due to the anticipated increase in Thermacoustic sales and the obsolescence of the existing equipment, it was decided that new manufacturing facilities would be constructed. J. H. Gessner, Alexandria Plant Engineer, was responsible for the design and requested assistance in determining the type of mixing action best suited for the product.

A method of assaying the uniformity of mixing in the existing equipment was developed. Several batches of Thermacoustic were prepared varying the mixing time and simulating the new production method. At a mixing time of 30 sec. it was found that the uniformity of mixing was within the accuracy of the test method ($\pm 1\%$).

The Product Manufacturing Procedure was revised when the new equipment was installed and a mixing time of 55 seconds was specified (± 10 sec. max).

4. Evaluation of Fiberfrax

Thermacoustic was manufactured in which Fiberfrax was wholly, and in part, substituted for Amosite. To date the product in which Fiberfrax was substituted for 75% of the Amosite has been partially evaluated. The results indicate that Fiberfrax is inferior to Amosite and it was reported that it is considerably more expensive. The press of other work has delayed completion of the evaluation, however, it is believed that no additional work need be done in order to reject Fiberfrax as a replacement for Amosite.

5. Utility of Asphalt Emulsion Primer

Technical Service Item #110, concerning the acceptability of Franco 121 Asphalt Emulsion as a primer for Thermacoastic was responsible for initiating this study. It was found that no standard method for evaluating the performance of asphalt emulsion was available. In addition, the need for a primer of any type was not readily apparent.

A rather extensive set of tests for the evaluation of asphalt emulsion primers was developed. The three emulsions then on the approved list were tested along with Franco. As a result, one emulsion has been formally rejected, (Chicago Paint Company) one tentative rejected, (Armstrong) and Franco was approved.

On the basis of these and other later tests, the present position is that the use of a primer is not required for satisfactory Thermacoastic performance. More tests will be required before the specifications can be re-worked. Recently a test was started in which a room was Thermacoastically treated. The material was applied to the unpainted, sand coated, plastered ceiling - an area of about 1000 sq. ft. No failures have been reported to date.

During the previously mentioned field trip to Philadelphia, it was found, by observing an actual job installation, that the primer was diluted to a far greater extent than is specified. The applicators stated that this was the typical procedure, and the statement was later verified by Mr. C. H. Wall. It is incredible that any of the dubious advantages of the primer can be gained at this level of dilution. A similar dilution was used on the Fort Benjamin Harrison job.

6. Fort Benjamin Harrison Job

Due to the large quantities of material involved, it was felt that this job should receive close surveillance in its initial stages. The task was to be jointly shared by the Plant Quality Control and Research. In this regard L. H. Fletcher spent several days on the job during which time several important factors of Thermacoastic application were clearly illustrated. They are as follows:

a. Training of Applicators

It is essential that applicators be given some sort of training as a preliminary to actual job performance. The average worker has had no contact with wrapper materials and in most cases finds the dust particularly obnoxious. He cannot be expected to learn the art of application while confronted with the dust problem in its worst form. If he were given initial instruction in arraying on a vertical surface where the dust is minimized, he could learn to handle his equipment properly and develop the techniques necessary for satisfactory performance.

b. Machine Performance

Trouble, in one form or another, was experienced with all of the "Wall" machines, and the amount of maintenance required was out of proportion to the running time. This could have been avoided by a more rigid manufacturing specification. In addition, several features of poor design were evident.

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The importance of the above would be greatly lessened on small scale applications where the crew is familiar with its machine. On jobs of the magnitude of the Army Finance Center, however, a production machine is required.

c. Dustiness of the product

It is believed that dustiness was one of the major causes of the failure of this job. The inexperienced workmen quickly lost interest in the job when they discovered the adverse conditions under which they were forced to work. Their eyes became irritated and they were annoyed with the necessity of wearing a mask. Experienced applicators, of course, know how to avoid the majority of the dust and learn to "live with" what is unavoidable. Considering the fact that the majority of Thermacooustic jobs are of such a nature that a small, well trained crew is sufficient, the above might lose some of its significance.

However, perhaps a more important factor is the attitude of the General Contractor and/or the Architects and Engineers. They must consider (1) the best time of other trades who cannot or will not work during the application, (2) contamination of air conditioning equipment, etc. (3) complication of the clean-up operations, and (4) discomfort to other occupants of the building if it is a reconstruction job.

For these and other reasons, reduction of the dust content of Thermacooustic is the greatest single improvement that could be made in the product. Let it not be concluded, however, that Thermacooustic is peculiar in this matter. Dustiness is a characteristic of all sprayed-on insulations tested to date.

On the basis of the recent competitive survey, Gold Bond Thermacooustic was equal to or better than the other two products tested. However, under IS-14 it was reported that Thermacooustic applied to solid backing is not competitive in regard to noise reduction. Steps are being taken to remedy this situation and it is believed that the required official test results will be obtained.

Until such time as competitive tests prove to the contrary, Thermacooustic is rated generally superior to other products of a similar nature. Improvements can be made, however, which will increase this superiority. Three suggested projects for research toward this end are:

- A. Determine the utility of an alkali emulsion primer. If possible, eliminate the use of a primer entirely. If not, complete investigation of other primers to replace alkali emulsion.
- B. Develop a process to remove the dust involved in the spraying operation.
- C. Develop a new blowing machine.

A discussion of each item is in order.

- A. Enough work has already been done on this project to warrant a feeling of optimism regarding the elimination of the primer. Sales was asked to cooperate to the extent of furnishing information on all future Thermacooustic jobs. It would then be possible to select certain representative jobs on which portions of the area to be sprayed could be left unprimed. In this way a history of field data could be compiled. As yet Sales has taken no action on this request.

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3. "Complete the investigation of the use of a latex primer instead of a regular asphalt emulsion".

This project is more or less tied in with the present primer study. If it can be shown that a primer is not necessary in the majority of cases, this project will be academic.

4. "We need some development of a new kind of Thermacoustic machine".

If the "green light" is given on this project, P. P. Weener is willing and able to tackle it. Research cooperation would of course be extended.

5. "The current price of Thermacoustic is .12/lb. and our chief competitor price is .09/lb. We should be actively working to reduce our cost to meet this kind of competition".

One possibility along this line is currently under consideration, i.e., the removal of the fungicide due to the suspected fungicide action of Portland Cement. This would result in a savings of 30.001/lb. Another possibility of cost reduction is milling stick asbestos (6a2-9m12). The remaining ingredients seem to be at the lowest cost possible. The new manufacturing facilities should reduce the labor cost, and other savings may be possible from a production standpoint.

6. "Fire tests on Thermacoustic when it is applied directly to steel".
(Two hour rating - 1 inch thick).

This requires organized official tests. There is no apparent need for Research.

7. "We need noise reduction coefficients for the following conditions:
1/2" thickness, solid back and suspension.
3/4" thickness, solid back and suspension.
1" thickness, solid back and suspension.
1-1/2" thickness, solid back and suspension.

All we have is the 1-1/2" thickness on suspension and the 1/2" and 3/4" on solid backing."

This request requires clarification. We would interpret this to mean Thermacoustic applied to sheetrock and tested on 1/2" mounting. Four sets of test panels being required. Our comment under item 20 applied here as well. (Official tests).

8. "We need a synthetic plastic or latex type material which can be sprayed over Thermacoustic for external construction, to be water proof and paintable, and also what effect it may have on the noise reduction coefficient".

The Acoustical Sales Department states that they have several suggestions concerning products that would produce the desired result. Samples could be obtained and evaluated if the project was given priority.

9. "For future work, we may require types of Thermacoustic necessitating a change of formulation. We should begin working on this possibility now".

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This request, as further discussed by Sales, does not pose any particular problems from a research standpoint. Thermacoustic formulation at twice the present density could probably be obtained economically with Chrysoetile.

A major disadvantage of Thermacoustic is the dust involved in the spraying operation. On small jobs with trained applicators it is not so evident, but the Fort Benjamin Harrison job illustrates the point forcibly. It is our opinion that a project to reduce the dustiness of the product should have top priority at present.

In addition to the above projects, there is one other of a general nature which deserves consideration. In conjunction with obtaining information on new jobs as mentioned above, it would be advantageous to have a complete record of past job histories.

It is believed that each of the projects mentioned should be given a separate agenda number. The project as now titled on the agenda is of a type that is difficult to bring to a satisfactory conclusion.

L. M. Fletcher
L. M. Fletcher

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