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FEASIBILITY STUDY - ALTERNATE PROCESSES FOR MANUFACTURE OF HIGH TEMPERATURE INSULATION

Date March 15, 1968

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Last January you asked me to take a good hard look at the various processes under consideration for the new Southwest "Kaylo" facility.

Attached is a copy of my report, which summarizes our study of every known process. As you will note, I reduced the list to just three processes, which merit further consideration for installation at the new facility. They include: pan pouring, filter pressing, and bonded aggregate.

The most important question which must be resolved before any final selection of process is made relates to the use of asbestos (Silihoff). Because of this problem, I also included an evaluation of Multi-Temp in my report. After all, it is the only asbestos free product available.

Unfortunately, I had to compare the various processes strictly on a technical basis. I am not in the position at the moment to make a recommendation as to the process or combination of processes we should select for the new facility, because of the lack of cost data. As soon as cost projections are completed by Gay and Brooks on all of the processes still under consideration, we will be able to at least make a recommendation as to which process we feel offers OCF the best product and gross margins in the years to come.

I am sure you are already aware of the advantages and disadvantages of Berlin's pan pouring process. Filter pressing has a lot of merit. It produces a stronger, better looking product, the product is precision molded and the process itself is highly automated. Bonded aggregate products as they now exist on the market have serious shortcomings. They break easily in transit and when handled. Why then would we still want to consider this process? The reason is if Philip Carey ever solves their breakage problem, they will have the best product on the market. It is precision molded, lends itself to automation, is water repellent, higher temperature resistant and is a non-autoclaved product. Last, but not least, is the fact it has the best chance of being made asbestos free. The only reasons for considering Multi-Temp are the facility is already available, the product is free of asbestos fibers and it could relieve some of the current overload at Berlin, especially in the block market.

It is my hope this report gives you a better insight as to the advantages and disadvantages of each process. Once we get cost data we will be able in a much better position of making a recommendation as to which process is best for the new facility and for the 1970+ market.

PLAINTIFF'S EXHIBIT
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INTRODUCTION

The expanding market for Kaylo pipe and block has made it necessary for OCF not only to expand the Berlin operation again in 1968, but also to consider building a new facility in the Southwest. The problem facing Management today is defining the type of process to be installed at the new facility. Should it be Berlin's pan pouring process, one of the more automated processes developed by our competitors or a combination of processes. Also, to be considered by Management is whether Multi-Temp has a place in the high temperature market of the future.

To help Management decide which process or combination of processes is most suitable for installation at the new Southwest facility, Kaylo R & D carried out an intensive evaluation of all known processes for the manufacture of high temperature insulation products. A lack of cost data on competitive processes made it necessary for us to limit this study to strictly a technical comparison rather than a more preferred economic-technical evaluation.

SUMMARY

The Kaylo R & D study confirmed the fact no other product can compete with Kaylo block made by the pan pouring process. It is by far the best on the market. Block made by the filter press process tends to delaminate, bonded aggregate block crumbles. It should also be noted that neither the filter press process nor the bonded aggregate process can be used to produce structural K-17 type core for the UL fire rated door market.

To maintain our position in the block and core markets, we must continue to produce such products by the pan pouring process. Management must decide whether block and core products are to be produced at the new Southwest facility. If the answer is yes, a pan pouring flatware line will then have to be installed.

The second decision Management must make relates to the type of process or combination of processes to be installed at the Southwest facility for the production of pipe insulation. If the decision is made to go to a process other than pan pouring, technology will have to be purchased. There is not sufficient time to develop from scratch an alternate process and still meet the timing for construction of the Southwest facility.

Management has a number of process options to chose from for the production of pipe insulation at the new Southwest facility. They include; (1) a filter press or bonded aggregate process to produce all sizes of pipe up to and including 30 inch OD, (2) a pan pouring process to produce the smaller pipe sizes and a filter press or bonded aggregate process for the production of large size sectional pipe and (3) a pan pouring process to produce the smaller pipe sizes and a Multi-Temp facility (located anywhere) for the production of large size sectional pipe. With our current level of technology, the pan pouring process should not be considered for pouring large size sectional pipe at the new facility.

SUMMARY (Cont.)

The Kaylo R & D study indicates that from a technical standpoint no one process has a distinct advantage over other known processes for the manufacture of high temperature pipe insulation. Each has its advantages, each also has a number of disadvantages. Only after a comprehensive cost analysis is made on each process will we be able to decide which process or combination of processes is most suitable for the new Southwest facility.

Our intensive technical evaluation of all known processes for the manufacture of high temperature insulation products indicates there are only three processes worthy of further consideration for possible installation at the Southwest facility. They include the Berlin pan pouring process, Johns-Manville's filter press process and Philip Carey's bonded aggregate process. All of the other processes considered during this study, with the possible exception of Multi-Temp, were rejected, because (1) the process would not yield a product suitable for OCF's needs or (2) the process was not sufficiently developed to meet the time schedule for installation in the new Southwest facility. The Crosfield filter press, non-autoclaved process failed on both accounts. Multi-Temp should only be considered for the production of large size sectional pipe and possibly as an additional facility for the production of high temperature block when Berlin becomes overloaded.

Before a final decision is made by Management as to the process they will adopt for installation at the Southwest facility and the product they will market in the 1970's and 1980's, they must consider a number of basic questions relating to rising labor costs, need for automation, need for a product of a higher quality level and the asbestos fiber health threat. This report will attempt to outline the questions which must be considered and acted on before the final decision as to process is reached. This report will also provide for Management's consideration a list of the advantages and disadvantages for each of the processes still under consideration for the new Southwest facility.

RECOMMENDATIONS

A visit to Johns-Manville's Research Center has already been made to appraise the filter press process. This visit must be followed-up by an OCF prepared cost projection and a plant visit. A visit should also be made to Philip Carey to appraise their bonded aggregate process. It too should be followed-up by a cost projection and, if possible, a plant visit.

Cost projections must be made or updated on the filter press, bonded aggregate, pan pouring and Multi-Temp processes. To achieve a fair comparison, cost projections for the pan pouring process should be made on a more automated process than now exists at Berlin. The latter is a reasonable request, since a major R & D/plant program is currently underway to reduce labor and batch costs and to achieve a higher degree of automation of the pan pouring process.

Cost projections on the filter press and bonded aggregate processes must be prepared at two levels of activity. One cost projection should be based on the assumption the filter press or bonded aggregate process will be used to produce the entire line of pipe up to and including 24" x 3". The second cost

RECOMMENDATIONS (Cont.)

projection should be based on the assumption the filter press or bonded aggregate process will be limited to the production of large size sectional pipe only. Under these conditions it must be tied in with the cost projection covering pan pouring of the smaller sizes of pipe. The Multi-Temp cost projection should be limited to large size sectional pipe only. It too must be tied in with the cost projection covering the pan pouring of the smaller sizes of pipe. To get a good economic picture of the various options available to us, cost projections should be prepared on the following process combinations.

Option	Block	Pipe
1.	Pan poured.	Filter pressed.
2.	Pan poured.	Bonded aggregate.
3.	Pan poured.	Small sizes, pan poured; large sizes, filter pressed.
4.	Pan poured.	Small sizes, pan poured; large sizes, bonded aggregate.
5.	Pan poured.	Small sizes, pan poured; large sizes, Multi-Temp.

It is possible the new Southwest facility will be limited to the production of pipe. Kaylo block would all be produced at Berlin and stockpiled at various distribution centers in the Southwest and West. Since this is a possible Management option, cost projections should also be made on the five pipe process combinations listed above, minus the pan pouring facility for block.

In deciding the type of process to be installed in the new Southwest facility, Management will have to give serious consideration to the Silikoff-asbestos fiber-health threat. What effect, if any, will it have on the future growth of the overall high temperature insulation market and our share of the market in particular? It could be the most important decision we face in deciding which process to install in the Southwest facility. The only asbestos free product on the market during the past 5-10 years was Multi-Temp. All three processes, pan pouring, filter press and bonded aggregate now under consideration for the new facility contain asbestos. The probability of removing asbestos from the non-autoclaved bonded aggregate product is far greater than it is from products made by either the Johns-Manville filter press or OCF's pan pouring process, both of which require autoclaving and are based on highly alkaline batch compositions.

In the event Management decides to install the Berlin pan pouring process for both pipe and block at the new Southwest facility, Kaylo R & D still recommends that an alternate process, either the filter press or bonded aggregate, also be installed on a limited basis either at Berlin or at the new facility. This should be further supported by an R & D program on the chosen alternate process at Granville. These recommendations are being made because it is our opinion the company should not have to again face the 'choice-of-process' dilemma we are now facing. If future market conditions demand a product made by a process other than pan pouring, we will have the technology, knowhow and experience to convert our manufacturing facilities over to the new process without delay.

Regardless of the decision as to the process to be installed at the new Southwest facility, the major R & D/plant program currently underway to automate the pan pouring process at Berlin should proceed full speed ahead, especially for the processing of Kaylo block.

RECOMMENDATIONS (Cont.)

During this planning period, many have suggested two processes be installed in the new Southwest facility, the pan pouring process for block and smaller sizes of pipe and a filter press for the manufacture of larger sizes of sectional pipe. The first question which must be resolved is will our customers and the I and C Marketing Division accept two types of pipe products. If the answer is yes, the second question is would the market also accept Multi-Temp if it were limited to the larger sizes of sectional pipe.

If the only reason for purchasing a filter press or bonded aggregate process from one of our competitors is for the manufacture of large size sectional pipe, i.e., sizes in the 13 to 24 inch ID range, then we must ask whether it would be better to direct a major effort toward producing large size sectional pipe by the pan pouring process (at acceptable gross margin levels) rather than direct such a major effort and expense toward a new process and technology for such a small portion of the overall market. Actually, there has been little, if any, technical effort directed toward learning how to pan pour large size sectional pipe with adequate gross margins. To achieve such a result, changes in mold design, as well as new techniques of pouring, prehardening and handling, must be developed. If Multi-Temp pipe is acceptable to the market and gross margins are projected as being adequate when limited to large size sectionals only, then OCF already has a product, a process and a facility available to service the large size sectional pipe market.

DISCUSSION

Asbestos

The first question which must be resolved is the use of asbestos as the reinforcing fiber. Today, all high temperature insulations contain asbestos reinforcement. In fact, during the past 10 years the only known asbestos free high temperature insulation on the market was Multi-Temp, a product sold for a brief period of time by OCF. To emphasize how important is the problem of asbestos as a fiber reinforcement, I would like to call to your attention D. W. Ladd's letter dated October 9, 1967 to D. M. Barthold concerning asbestos and Kaylo expansion. Quoting from Mr. Ladd's memo, "I think there is no other consideration which is of paramount importance to this whole subject. As you are well aware, the government will probably blow the whistle relative to the use of asbestos in the not too distant future and before we embark upon a substantial expansion program at Berlin and/or consider putting a new facility in the Southwest, we had better be damn sure that we have an answer to the asbestos threat. Work has been done on this in the past and to date there has been no successful answer."

The probability of replacing asbestos fibers in calcium silicate products is rated at best at 50/50. No solution to this problem has been found by OCF. Johns-Manville told us recently they too have had no success in getting glass fibers to survive the autoclave process. If the decision is to install the Berlin pan pouring process or the Johns-Manville filter press process at the Southwest facility, we are accepting the fact the reinforcement used will probably be asbestos (unless a breakthrough is made by R & D during the next ... so in modifying glass fibers to survive the alkali and the autoclaving

Asbestos (Cont.)

If Management decides the asbestos threat is still with us, then careful consideration should be given to the bonded aggregate process. It does not involve the highly alkaline calcium silicate batch (which attacks glass) and does not require as part of the process the use of expensive autoclaves (which dissolve glass). Although Careytemp, Philip Carey's bonded aggregate high temperature insulation, contains some asbestos the probability of developing a bonded aggregate product reinforced with 100 percent glass fibers remains quite high.

Johns-Manville told us during our recent meeting in Manville, New Jersey, they were surprised we never followed-up on our high temperature glass fiber insulation product line (Multi-Temp). By the tone of the conversation, they seemed to be concerned about this product. If it were to be placed back on the market, it would be the only asbestos free product available. If the asbestos threat is real and is a serious threat to OCF's participation in the high temperature insulation market of the future, then we should consider directing a major R & D effort toward product and/or process modifications to raise gross margins to adequate levels.

Alternate Process Licensing

If a decision is made to install a process other than pan pouring at the new Southwest facility, technology will have to be purchased. There is not sufficient time to develop from scratch an alternate process and still meet the timing for construction of the new facility. Since the purchase of technology will probably mean taking out a license from a competitor, the cost of the license and its adverse effect on gross margins and competitive position in the market must all be carefully considered.

OCF already has 20 years or more of technology on pan pouring and several years plus a patent position on Multi-Temp. Major strides have been made in recent months in mechanizing the pan pouring process at Berlin. No costs for licensing will be involved if the pan pouring process is chosen for producing both pipe and block at the new facility. The same is true if large size sectional pipe are produced by the Multi-Temp process.

Competitive Processes

Before tabulating the major advantages and disadvantages for each of the three processes still under consideration for installation in the new facility and for Multi-Temp, I would like to compare briefly each process against the others.

The major problems with products made by the pan pouring process include: (1) they are not as strong as products made by the filter press process, (2) they have a visual appearance inferior to both filter press and bonded aggregate products, (3) not being precision molded, dimensional and nesting problems result in customer complaints and (4) products made by pan pouring involve considerable hand labor to produce. Labor costs for the production of pan poured pipe constitutes nearly 40 percent of the total manufacturing cost. With labor costs rising rapidly, pipe made by the pan pouring process could be

Competitive Processes (Cont.)

placed at a competitive disadvantage in the future with pipe made by one of the more automated processes, such as filter press or bonded aggregate. It is quite unfortunate OCF did not place the same emphasis during the past 5 to 10 years on automating our pan pouring process as our competitors have on theirs. If we had, it is quite possible we would not be today in the position of having to take a license from one of our competitors.

Kaylo made by the pan pouring process does have a number of advantages over all other products on the market today. They include: (1) the ability to produce by one process both light density heat insulation and heavy density structural core material, (2) the tremendous flexibility of the daily mix of goods, coupled with the ability to expedite desired various sizes and thicknesses of both pipe and block, (3) the best service shipping cycle in the industry, (4) the versatility of batch composition to achieve lower costs of batch on a cubic foot basis, (5) production of the best block products on the market and (6) production of light density heat insulation and structural core with maximum temperature resistance of 1800° F.

As to competitive processes, the filter press developed by Johns-Manville has drawn the most interest from OCF personnel. There is no doubt it has a number of advantages over both the pan pouring and bonded aggregate processes. Products made by this process have considerably higher flexural, compressive and impact strengths. It has a better visual appearance than Kaylo and like the bonded aggregate process, produces pipe and block products which are precision molded. The filter press process also lends itself to the production of large size sectional pipe up to and including 30 inches OD. Field breakage of filter pressed products is extremely low. Finally, the process as now developed by Johns-Manville is highly automated. When compared to products made by the bonded aggregate process, filter pressed products have two distinct advantages, higher physical strengths and lower breakage characteristics.

The filter press process has a number of disadvantages when compared directly with the pan pouring process. They include; (1) shipping delivery cycles are considerably longer, (2) flexibility in the daily mix of goods is poor, (3) batch costs are higher, (4) does not lend itself to the fabrication of fittings, (5) product densities are higher, (6) has a tendency to delaminate when moisture is absorbed, (7) will not produce structural core, (8) produces block products less acceptable to the market and (9) operating efficiencies due to a 5 to 6 hour period for mold change over are still very low compared to operating efficiencies for the pan pouring process.

The bonded aggregate process as developed by Philip Carey has many advantages over both the pan pouring and filter press processes. If and when Philip Carey solves their handleability and breakage problems, they will have by far the best product on the market. Some of the major advantages of the bonded aggregate process include; (1) a very low manufacturing cost, (2) a very low investment cost, (3) a non-autoclaved product, (4) ability to use glass fiber as reinforcement, (5) ability to produce a precision molded product, (6) a process which lends itself to high production rates at low investment costs, (7) a 1500 to 1600° F temperature resistant product and (8) water repellency.

Competitive Processes (Cont.)

When compared directly with filter pressing, the bonded aggregate process has two major disadvantages. It produces a product with lower strengths and one that is susceptible to breakage when roughly handled. On the other hand, it has a number of advantages over filter pressed products. Overall process costs are lower, batch costs are substantially lower, the product can be marketed for higher temperature applications (1500 vs 1200° F), it is water repellent, fittings can be fabricated from the product, investment costs are much lower (no autoclaves) and it probably can be made free of asbestos. The ability to use glass fibers as reinforcement in this product, when combined with the tremendous glass fiber knowhow available to OCF personnel, makes it mandatory our Management give careful consideration to the bonded aggregate process before rejecting it in favor of a process which requires asbestos as the reinforcing fiber.

Where does the Multi-Temp product and process fit in the overall picture? The product as we currently know it does not yield adequate gross margins to compete across the board with pan poured, filter pressed or bonded aggregate products. However, one must remember it is a glass fiber product, one that is a natural for OCF to market and one that could be produced at any of our CP plants. If it were to be placed back on the market, it would be the only asbestos free product on the market today.

Should we go ahead and install the pan pouring process at the new Southwest facility rather than the filter press or bonded aggregate process? This is a decision which Management must make. If the filter press or bonded aggregate process is chosen to produce the complete range of products at the new facility then there is no need to reconsider Multi-Temp at this time. If and only if the asbestos threat reaches the 'danger point' would we then want to reconsider an asbestos free product, such as Multi-Temp for the high temperature insulation market.

If for some reason, such as high cost of licensing, Management decides to install the pan pouring process in the new facility, we will again be facing the problem of deciding how to produce large size sectional pipe. Under such circumstances Multi-Temp could be the answer. Even if Management decides to go with the pan pouring process for all production except large size sectional and choses to license the filter press or bonded aggregate process to produce these products, we must raise the question whether it is worth all the problems and costs to license another process from one of our competitors for such a small percentage of the market.

We must market large size sectional pipe to remain competitive. If we chose not to license another process, we would have three choices; (1) fabricate large size sectional pipe as we do now at Berlin, (2) start up a crash program to learn how to pour large size sectional pipe at adequate gross margins by the pan pouring process or (3) we could market a line of large size sectional Multi-Temp pipe. Only under those conditions where all production except large size sectional pipe is to be made by the pan pouring process at the new Southwest facility would I recommend we reconsider Multi-Temp. Limited to the production of large size sectional pipe (and to block when Berlin block producing facilities

Competitive Processes (Cont.)

become over taxed as they are today), Multi-Temp may have a place in today's market. It may be cheaper to produce large size sectional pipe by the Multi-Temp process than by the current, fabrication technique used at Berlin. It would increase our share of the total market immediately.

Pan Pouring (Kaylo)

Advantages

1. The highest mix of goods flexibility. This flexibility results in the lowest workable finished goods inventory for any of the processes now in use for the manufacture of high temperature insulation products.

2. The best shipping cycle in the high temperature insulation industry with normal inventories.

3. Block produced by the pan pouring process is the acknowledged leader of all flatware high temperature insulations on the market today.

4. Pan pouring is an established process at OCF. Plant personnel are well trained as to process. We have a 20+ year working background with this process.

5. Process permits considerable versatility as to batch composition. Various additives and extenders can be added to reduce costs.

6. Kaylo contains an extremely low percentage of soluble chloride. Meets AEC and military spec requirements.

7. Higher daily production of pieces are procurable in the same sizes and thicknesses for both pipe and block when needed for expediting shipments than in any of the competitive manufacturing processes.

8. The 1968 expansion at Berlin will further improve the service cycle. It is already better than the service cycle of any of our competitors.

9. Kaylo has high acceptance inthe high temperature insulation market among owners, distributors and applicators.

10. Pan pouring is the only process which lends itself to the production of structural core. Only one with UL fire ratings.

11. K-20 pipe and block products produced by the pan pouring process are in a class by themselves. K-20 products can be used at temperatures up to 1800° F.

12. Batch mixing for pan pouring is the least complicated. No gelling of batch required.

Pan Pouring (Kaylo) (Cont.)

Advantages (Cont.)

13. Drying costs are currently lower for pan poured products than for products produced by any other process. This advantage will soon be lost since the SID cylinder patent expired in January 1968.

14. Densities of pan poured products are lower than densities of filter pressed products.

15. In general, thermal conductivities of pan poured products are lower than for competitive products.

16. Pan pouring operating efficiencies are considerably higher than they are for filter pressing.

17. Fittings can be cut and fabricated from pan poured products. Filter press products delaminate when attempts are made to fabricate them into fittings.

18. No license would be involved if the decision is to install a pan pouring process at the new Southwest facility.

Disadvantages

1. Physical strengths of pan poured products are lower than those obtained from filter pressed products.

2. Visual appearance of surface is inferior to both filter press and bonded aggregate products.

3. Pan pouring is not a precision process. Problems of dimensional stability and nesting of ware show up from time to time in the field.

4. With current level of technology, large size sectional pipe cannot be poured with adequate gross margins by the pan pouring process.

5. Like filter pressed products, pan poured products are reinforced with asbestos fibers. With current level of technology, glass fibers cannot be used in either process.

6. Pan pouring requires the use of expensive autoclaves (SID's) and Dowtherm units.

7. Pan poured K-10 products have a maximum temperature application of 1200° F vs 1500 to 1600° F for bonded aggregate products.

8. Pan poured products have higher breakage losses while in transit and when handled at the job site than filter pressed products.

Pan Pouring (Kaylo) (Cont.)

Disadvantages (Cont.)

9. Pan pouring involves considerable hand labor. Labor costs to produce pipe are currently averaging 40 percent of total manufacturing costs. Level of automation at Berlin is still very low.

10. Process job efficiencies for the pan pouring process are lower than those for competitive processes, because of the high degree of man-handling in the plant.

11. Pan poured products are not water repellent. Only bonded aggregated products and Multi-Temp are water repellent today.

Filter Press (Johns-Manville and Ruberoid)

Advantages

1. Filter pressed products have higher physical strengths in all three categories; M/R, compressive and impact strengths.

2. OD and ID surfaces are smooth and free of air holes. Has an excellent visual appearance.

3. Filter pressing as developed by Johns-Manville is a highly automated process. Labor costs as a percentage of total manufacturing cost are quite low.

4. The filter press process lends itself to the molding of large size sectional pipe up to and including 24" x 3".

5. The Johns-Manville product contains no amosite asbestos, only 7 percent chrysotile.

6. Filter pressed products suffer very little in transit and job site breakage.

7. Process job efficiencies are extremely high (98-99-percent) for the filter press process as developed by Johns-Manville.

8. Cylinder capacity for induration of green ware is greater for filter pressed products than for pan poured products. This is because filter pressed ware can be stripped from the mold prior to autoclaving.

9. Filter pressed products have fewer broken corner problems during processing.

10. Very little waste material in the Johns-Manville process. Only legs of pipe are trimmed.

Filter Press (Cont.)

Dissadvantages

1. Shipping cycles are considerably longer than those for pan poured products.

2. Poor flexibility in the daily mix of goods.

3. Products contain asbestos fibers. With current level of technology, glass fibers cannot be used as reinforcement.

4. Filter pressed products are not water repellent. Tend to delaminate when wet.

5. Johns-Manville probably do not meet Mil Specs, because of high chloride content.

6. Process involves the use of expensive autoclaves.

7. Filter pressed products have maximum temperature applications of 1200° F vs 1500-1600° F for bonded aggregate products.

8. Block produced by the filter press process is substantially inferior to pan poured block and has a tendency to delaminate.

9. Structural core products cannot be made by the filter press process. No UL fire rated products.

10. Filter press products have a tendency to delaminate when moisture is absorbed.

11. Operating efficiencies still remain low (65 percent) due to 5 to 6 hours required for mold change over.

12. Batch costs are considerably higher than those for the pan pouring process. Not flexible concerning use of additives to lower batch costs.

13. Densities of filter pressed products are higher than densities of pan poured products.

14. A very large inventory of finished goods must be maintained, because of the limited range of the mix of goods.

15. Production rates of same sizes of ware is usually less per hour for filter press than for pan pouring.

16. Skilled craftsmen are required to change the precision mold equipment.

17. Fittings cannot be fabricated from filter pressed ware -- problem is one of delamination.

Bonded Aggregate (Philip Carey)

Advantages

1. No autoclave required to produce bonded aggregate products.

2. Low investment costs.

3. Precision molded product - good dimensional stability - nests well.

4. Smooth surface - no air holes.

5. Can be reinforced with glass.

6. Product is water repellent.

7. Temperature limitations for bonded aggregate (Careytemp) products are 1500 to 1600° F (300 to 400° F higher than for pan poured and filter pressed products).

8. Bonded aggregate offers potential of being a highly automated process -- potential low labor cost process.

9. Batch costs are lower than those for the filter press process.

10. The bonded aggregate process is capable of producing large size sectional pipe.

11. Pipe fittings can be fabricated from bonded aggregate products.

Disadvantages

1. Bonded aggregate products are quite fragile, break easily when handled.

2. Has lower physical properties than calcium silicate type products.

3. Flexibility in the daily mix of goods is rather poor.

4. Like filter press products, shipping cycles would be much longer than those for the pan pouring process.

5. Bonded aggregate block is inferior to Kaylo block. Crumbles when handled.

6. Bonded aggregate process will not yield structural core. The tendency for the product to crumble makes it unsuitable for use in UL fire rated door applications.

7. Large inventories of finished goods must be maintained, because of the limited range of the mix of goods.

8. Bonded aggregate products do not fabricate as well as pan poured products due to breakage from sawing and cutting.

Multi-Temp (OCF)

Advantages

1. Multi-Temp is a product made from Fiberglas, the basic product of the Corporation. It is free of asbestos fibers.

2. It lends itself to decentralized operations, adaptable to any General Products plant capable of making Fiberglas pipe insulation.

3. The product is rain and snow resistant and water repellent in that capacity.

4. The saturation process is not a complicated one to operate efficiently.

5. Multi-Temp pipe has an acceptable "K" value.

6. Multi-Temp pipe can be applied to 1000° F surfaces.

7. Large size sectional pipe can be produced by the Multi-Temp process.

8. Breakage due to rough handling would be nominal.

9. Easy to cut, good fabrication characteristics.

10. Excellent gross margins (33 percent) projected for block.

Disadvantages

1. The maximum temperature resistance of the product was 1000° F rather than 1200° F for K-10 Kaylo.

2. The ends and edges were susceptible to in transit and handling damage.

3. Multi-Temp products were more dusty than competitive materials.

4. Projected gross margins for Multi-Temp pipe were lower than those projected for Kaylo pipe.

5. In the Newark pilot plant facility, job efficiencies were very low due to excessive offware. Major causes of offware were excessive and rough handling, improper operation of process and burn ware in the oven.

6. Distributors objected to carrying inventories of two different types of high temperature insulation, which called for additional warehouse space.

7. Softer product than the calcium silicate and bonded aggregate type products.