STUDY OF FIBER GLASS INDUSTRY, INC.

C D Bujan

SEMINAR IN MANAGEMENT

1972

Study of

FIBER GLASS INDUSTRIES, INC.

AMSTERDAM, N.Y.

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ACKNOWLEDGEMENTS

The study team is sincerely appreciative of the attention and cordial attitude of Mr. Ara T. Dilidilian and his staff. The forthright nature of the discussions and general overall attempt to make essentials of the study available to the team greatly enhanced our ability to rapidly assimilate the pertinent data.

The study team is also indebted to Professor Delmar Karger, School of Management, Rensselaer Polytechnic Institute for his valuable guidance during all phases of the study.

INTRODUCTION

FOREWORD

This management study is a requirement of graduate course G60.683, Seminar in Management, of the School of Management, Rensselaer Polytechnic Institute, Troy, New York. It represents the results of the combined efforts of the 1972 study team in their examination of managerial practices at Fiber Glass Industries, Incorporated, (FGI), Amsterdam, New York.

A. PURPOSE

This study is a means for students of management to apply theory and concepts to a practical and realistic business situation. This was accomplished by:

Determining corporate strategy and objectives.

Determining strengths and weakness of FGI.

Determining the effectiveness of FGI's managers in achieving its objectives.

Recommending viable changes that are realistic and practical, which can be implemented within the resources and capabilities of FGI, to increase efficiency and effectiveness in achieving its strategic objectives.

This study also provides FGI a current evaluation of their management practices in return for their cooperation and time spent with the study team.

APPROACH

The approach used considers FGI's strengths and weaknesses and focuses on critical phases of managerial action taken to achieve objectives. A combination of evaluating techniques was used to maintain perspective in changes recommended, consistent with the size of FGI. Recommended changes are those within the capability of FGI.

METHOD

Personal interview and observation of FGI's managerial/operational practices, and company records were the source of data used in this study. Throughout the study period, various meetings between the team and Professor Delmar Karger were held to interchange information and formulate areas for further study. Noteworthy is the trend of on-going change that is taking place within departments of FGI, consistent with our final recommendations.

FORMAT

The format used in this report is slanted toward the modern trend of using present tense and active reporting style. It is specifically designed to assist FGI by objectively discussing its problems. In this regard, the many sound managerial actions taken by FGI are not redundantly restated. Problems are stated, analysed, and recommendations made relative to changes we consider necessary for satisfactory remedies. Recommendations are numbered consecutively throughout the report to facilitate discussion and identification.

B. HISTORICAL HIGHLIGHTS

Fiber Glass Industries Incorporated (FGI) a tightly held firm, was organized as a corporate body in Amsterdam, New York in 1957. FGI evolved from the Amsterdam branch of the Bigelow-Sanford Corporation, which produced mechanically bonded mats from fiber glass.

Mr. Ara T. Dildilian, now president of FGI, felt that the Amsterdam plant could operate more profitably if it were not burdened with the heavy overhead rates assigned by Bigelow. Also, the lack of flexibility and customer service resulting from complexities in order handling between Amsterdam and the home office added to delays. Bigelow initially reacted favorably to this suggestion, but then unexpectedly terminated operations at Amsterdam. Mr. Dildilian and associates seized this opportunity to purchase the Amsterdam plant from Bigelow-Sanford and form FGI in 1957.

The fiber glass reinforced plastics industry is only twenty-five years old. Industry growth was rather slow during the post-World War II years. It was not until the mid-fifties when, after a few successful civilian and industrial uses, the pace of growth quickened.

During the past decade the industry has grown at a rate of 9% compounded annually. Within this same period FGI grew at a 22% rate compounded annually. FGI experienced several capital crises during this growing period. FGI gained their niche in the fiber glass market as a custom supplier, but is held down from maximum sales levels by the low liquidity of the firm.

The formation of and subsequent dissolvement of the Sani-Glass Corporation, the settlement in founding the Polyply Corporation, and the build up of the Graham, Texas Corporation have been the principal

drains on available funds. Thus, diversification of FGI's product line has been limited to internally generated innovation. The primary product groups today are:

ROVCLOTH - a woven fabric of fibrous glass roving in either continuous or spun strands.

TEXTILMAT - a high tensile-strength mat of chopped fibrous glass strands, mechanically bonded to woven glass cloth.

TYPE C FABMAT - a blend of chopped glass fibres chemically bonded to a layer of rovcloth.

ROVMAT - a mechanically bonded mat of chopped strands of fibrous glass reinforcing containing continuous and parallel strands of glass roving.

FORMAT - a mechanically bonded mat of chopped fibrous glass strands.

GLASS CLOTH - a unidirectional fabric of spun glass strands.

FILOMAT - a mechanically bonded fibrous glass suitable for high temperature and acoustical indulation application.

LIASIL - a unidirectional, high modulus, reinforcement of parallel strands of glass roving and fine woven cross thread.

KEMAT - a chopped strand, chemically bonded mat.

Innovation is the key to FGI's growth. This is one of the main factors preserving their hold on the market segment. Their pioneering efforts are respected and have encouraged growth in the industry. Technological development is their advantage and the changing economical-political-social environment is their adversary. FGI must grow to survive.

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PART I

ORGANIZATION OF THE FIRM

A. Summary

The formal organization of the firm was evaluated on the basis of its suitability to the company's present strategy and size, its adaptability to growth requirements, and its relation to the skills and personalities of the present managers of the company. Figure I-1 diagrams our conception of the present relations of FGI and its subsidiaries. Figure I-2 shows our conception of the internal organization as of February 1972. At the top level, the organization is divided into three functional divisions-- the finance division (Treasurer), the sales division, and the manufacturing division (Plant Manager). This traditional functional division is well suited to the present and future needs of the company. The manufacturing function is further divided along both functional lines (Maintenance Department and Purchasing Department) and along product lines (FABMAT Department and Weaving and MAT Department). This arrangement was adopted to make the best use of available managerial talent. Its future suitability will be analyzed below.

The changes in formal organization recommended should be considered a long range optimal goal to be implemented piece-meal as the company's situation permits. We do not recommend that the changes be implemented in haste without regard to the personalities and capabilities presently existing, simply to obtain the more theoretically "correct" organization shown in Figure I-3.

⊙ Key - Plant Location

F.G.I. Ltd. Canada

F.G.I. 51% of voting stock

Pres: Jimmy James

James Fiber Company

Southwest Fiberglass Industries

owned by F.G.I.

Pres: C. Peterson

Treas: R. Roginski

Plant Manager: T. Pierce

Fiberglass Industries.

Fortesil Corporation

- subsidiary of F.G.I.
- counterpart to F.G.I. Ltd. Canada
- F.G.I. 50% of voting stock
- F.G.I. Ltd. Canada 50% of voting stock

Homestead Place Corporation

- owned by F.G.I.
- owns building which F.G.I. leases
- Aralite Corporation owns a house which it rents

F.G.I. United Kingdom

- F.G.I. 50% of voting stock
- James Fiber Company 25% of F.G.I. U.K.
- Douglas Garland General Manager 25% of F.G.I. U.K.

Figure I-1 FGI and Subsidiaries

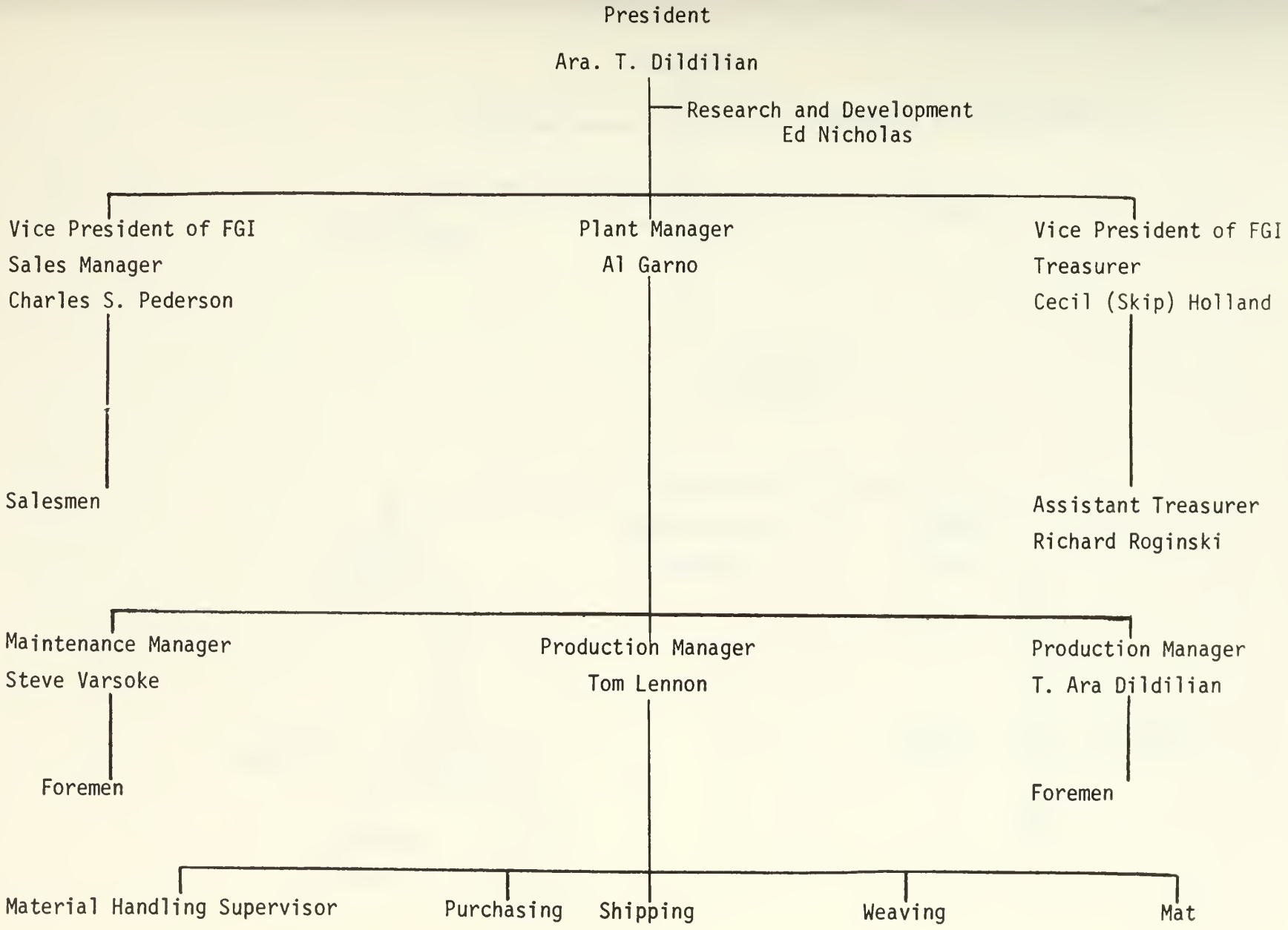


Figure I-2 Organization - February, 1972

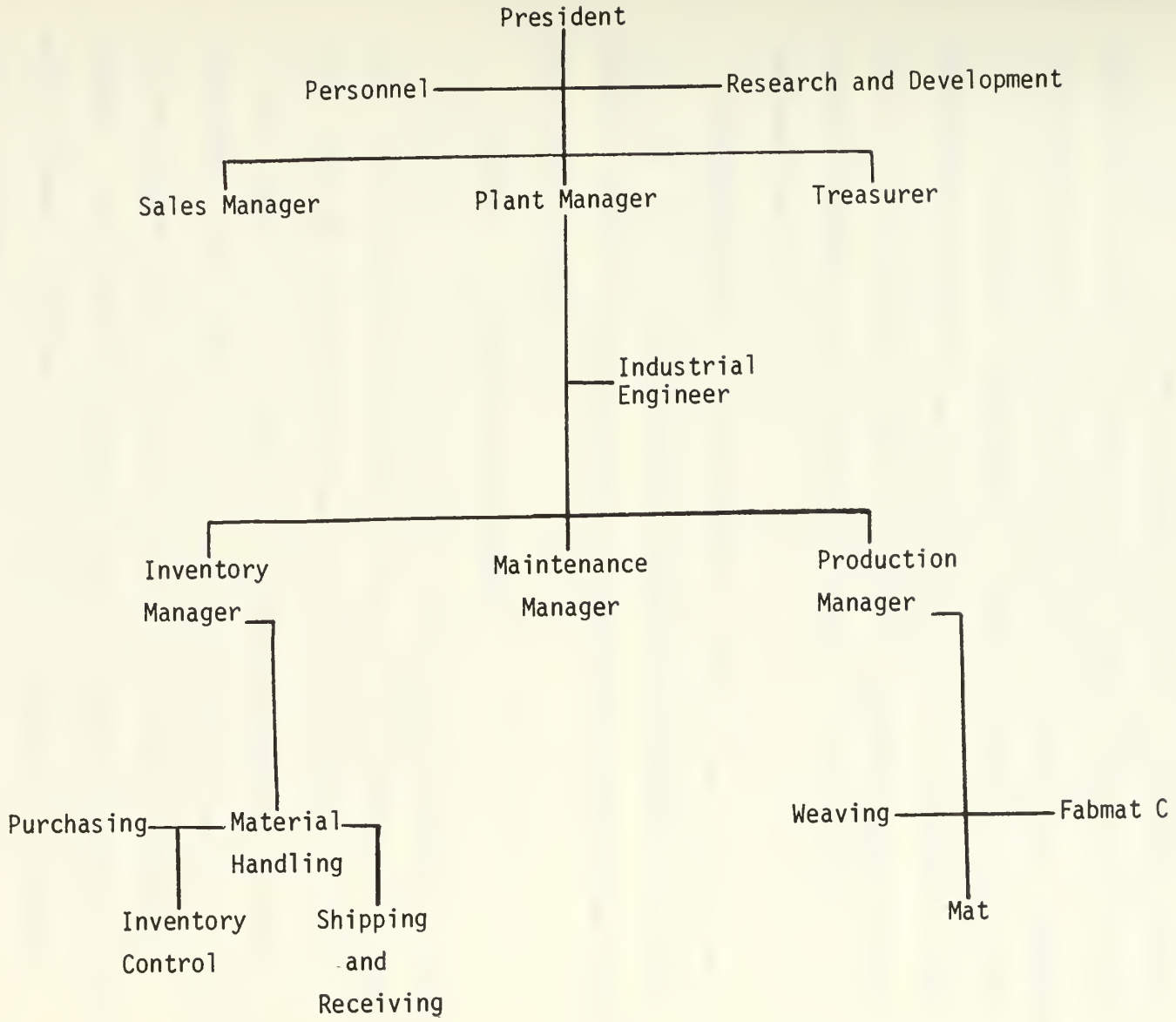


Figure I-3 Goal Organization One-Five Years

B. Analysis and Recommendations

Problem. Material Handling and Shipping and Receiving.

Analysis. The FABMAT Department must rely on the Weaving and Mat Department for material handling and for shipping and receiving functions. To eliminate possible conflicts and to permit accurate cost accounting for the two production departments, a material handling and a shipping and receiving capability must be established in each production department or else the present capability must be separated from the Weaving and Mat Department and placed directly under the Plant Manager. We recommend the latter course.

Recommendation I-1. Remove Material Handling and Shipping and Receiving from the Weaving and Mat Department and combine it with the present Purchasing Department under a new position which we have entitled the Inventory Manager.

Problem. Two production departments.

Analysis. The division of part of the plant by product is inconsistent with the otherwise functional division of the plant and is unnecessary, given the present and projected levels of production of FABMAT C. If recommendation I-1 is adopted, one production manager could supervise production of all products. All production scheduling would be centralized and one manager freed to take on the responsibilities of Inventory Manager. The Production Department could be further divided by products under foremen, if desired, and new product foremen could be readily added as necessary.

Recommendation I-2. Combine all production under one manager with further sub-division by products under him, as necessary.

Problem. Lack of permanent work groups.

Analysis. The present practice of frequently shifting workers from one job to the next hinders the formation of natural work groups and detracts from the manager's effectiveness as a leader. The adoption of recommendation I-1 and I-2 would place all production workers under one manager and partially alleviate this problem.

Recommendation. None. Further support for recommendation I-1 and I-2.

Problem. Lack of a personnel manager.

Analysis. The need for a personnel supervisor is detailed in Part II. This need can be met by the establishment of a small Personnel or Industrial Relations Office as shown in Figure I-3.

Recommendation I-3. Assign a person as personnel director to report to the president.

Problem. Continuity of Management.

Analysis. The size of FGI precludes a costly system of dual training for management. Preparation should be made for continuity in the event a key person becomes absent or incapacitated. This can most practically be done through the use of written position descriptions for each of the management jobs and by less formal, but written, desk-top procedures for all foremen and key clerical personnel. Preparation of a linear responsibility chart such as the one shown in Figure I-4 can greatly reduce the length of the position descriptions and is easily up-dated. In contrast to the position description, such a chart is a useable working tool. Preparation and up-dating of the chart should be under the supervision of the personnel director. This would allow the line manager to concentrate on keeping his position description up-to-date with the status of current projects and plans, rather than concerning himself with the changing intricacies of internal company lines of authority

and relationships.

Recommendation I-4. Up-date position descriptions for all managers.

Recommendation I-5. Require foremen and key clerical personnel to maintain written desk-top procedures that would enable another person to perform their jobs in their absence.

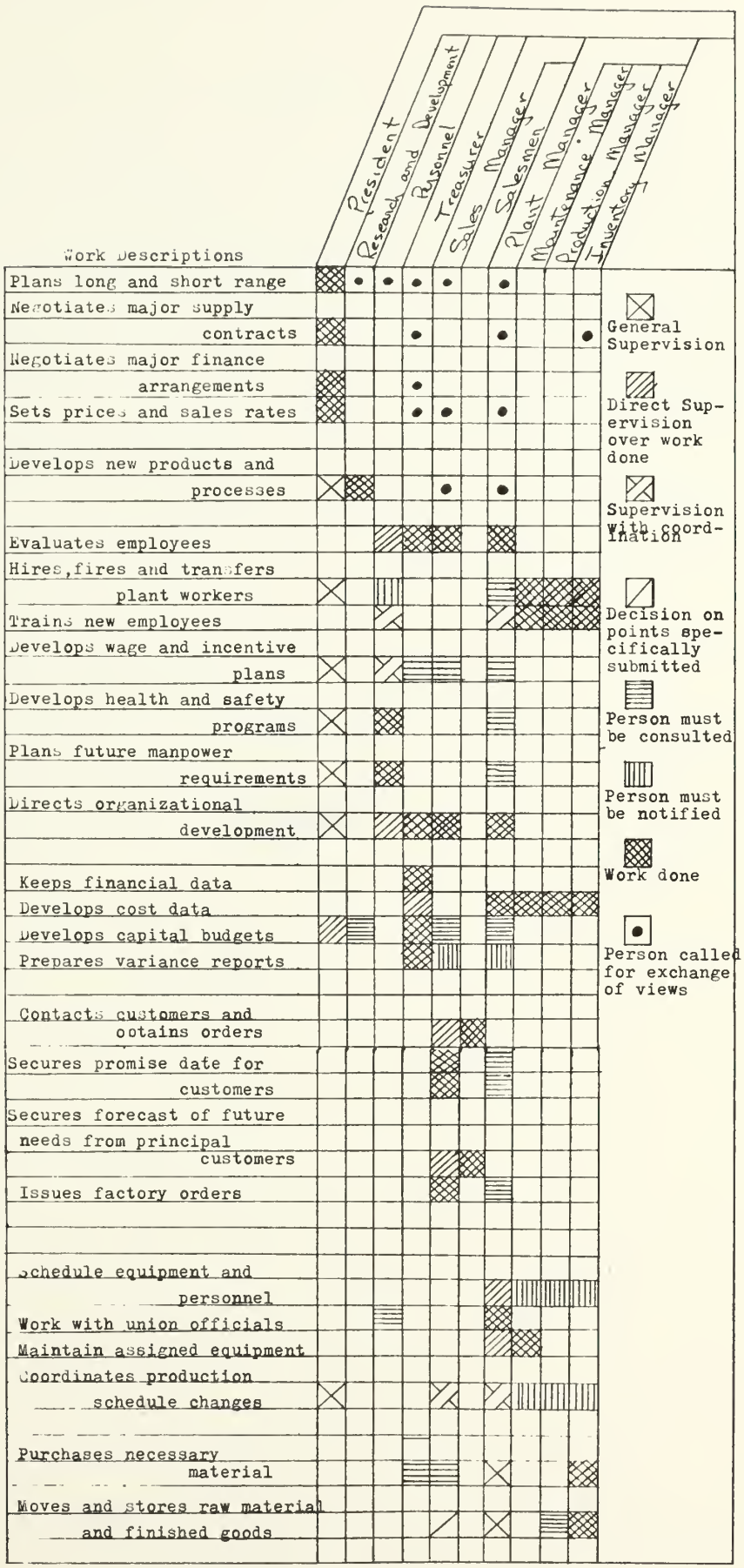
Recommendation I-6. Adopt a detailed linear responsibility chart similar to the one shown in Figure I-4.

Problem. Blurred lines of authority.

Analysis. The managers at FGI appear to operate effectively under an understood system of informal relationships. These relationships are certainly more important to the day-to-day operation of the company than formal organization schemes. Nevertheless, we believe that a formal plan that is logical and that shows clearly where the different positions fit into the organization is extremely valuable and will help the company by-pass some of the problems usually encountered when growth occurs or when new managers are brought into the company. For example, vagueness of authority between the plant manager and the sales manager in matters of production scheduling is always a potential trouble spot. We have suggested a solution to this problem in our proposed organization charts (Figures I-3 and I-4). If the plant manager is to be held responsible for meeting production requirements he must be given full authority in scheduling. If the sales manager is given scheduling authority, then set-up costs and some maintenance costs must be charged to sales.

Recommendation I-7. Adopt the organization plan shown in Figures I-3 and I-4 as the long range goal of the company.

Recommendation I-8. Prepare and distribute interim organization charts to clearly define relationships and lines of authority as the company grows and its organization changes.



Linear Responsibility Chart

Figure I-4.

PART II

PERSONNEL

A. SUMMARY

FGI employs in excess of 100 personnel. Those workers involved with production and production-support activities are organized into the following departments: Weave, FABMAT, Mat, Maintenance, and Material Handling. Productive activity is organized on a three-shift basis under the supervision of six foremen: Weave (day), FABMAT (day), Shipping (day), Mainteance (day), Second Shift, and Third Shift. A noticeable characteristic of the work force is the absence of younger workers. Sixty-three percent are over 50 years of age; eighty-seven percent are over 40 years of age.

Compensation of the work force is basically on an hourly-rate basis. Additionally, about 60% of the workers are eligible to receive incentive payments which are keyed to productivity in excess of a predetermined level. Depending on the job, productivity is measured in pounds, bales, etc. Average wages paid at FGI compare favorably with the average wages of other industries in Amsterdam, New York. Despite this, turnover and absentee rates are relatively high. These rates may be attributable to other factors in the working environment. Unfortunately, the work force at FGI is also characterized by a higher than normal frequency of accidents and injuries.

At the present time, there is no formal training program in force. Men are trained to fill vacancies as they occur. This has resulted in production limitations due to the lack of specific skills or due to the lack of sufficient workers to operate additional shifts, even when justified by increased customer orders.

Up to now, the need for a program of personnel management has not been felt. A minimum of benefits, services, and activies are provided.

Activity of a non-work nature is limited to an annual company clam bake.

B. Analysis and Recommendations

Problem. The turnover rate at FGI is considered to be high; this rate means that unnecessary additional costs are incurred.

Analysis.* Labor turnover is one of industry's most costly problems. FGI has a labor turnover problem with 33.6% average labor turnover for the past six years. FGI's best year was 1970 with 23.8% and their worst year was 1969 with 49.0% (all figures have been adjusted for increases and decreases in work force size). FGI's 1971 average turnover was 30.1% as compared to a national average for manufacturing of 6.2% and a Montgomery County average turnover rate between 15 and 35%. (The Montgomery County figures are estimates from the New York State Employment Office.)

Labor turnover is significant to management because it is a direct waste of manpower, materials, and money. While it is difficult to estimate exactly the cost of turnover, it is possible to realize its significance by examining the following list of general factors which contribute to the overall costs of turnover in manufacturing companies.

1. Increased Operating Expense
    a. Cost of On-the-job Training increases to the extent that the new worker produces less than standard; it includes the time spent by the foreman with the new worker.
    b. Cost of Added Labor
        (1) Other employees may spend extra time to make up the deficiency of a new employee, if quantity and quality of production are to be maintained.
        (2) Overtime pay may be necessary in maintaining quantity and

quality of production.

c. Loss of Effective Production between the time of decision to quit and the actual time of quitting, and of complete production loss during the period of the job vacancy.

d. Cost of Material Spoilage by new employees, including excess of scrap and re-work caused by inexperienced worker.

2. Increased Overhead Expenses

a. Increase in Unemployment Insurance Premiums

b. Increase in Accident Insurance Rate

c. Additional Overhead Cost per Unit Due to Lower Production

When the quantity of production decreases and overhead remains constant, the cost per unit increases.

d. Administrative Cost

(1) Employment Office Expense

(2) Medical Examination Expense

(3) Advertising Expense

(4) Cost of Induction

(5) Accounting and Payroll Costs

(6) Employee Welfare Expense

Turnover cost will vary depending on the particular needs and characteristics of the company. The American Management Association has done several studies on the cost of turnover and they estimate the average cost to be $500 per employee (a figure which they call conservative.) The actual estimates ran between $232 to several thousand dollars. Even if the lowest figure of $232 is used to estimate FGI's turnover cost, the cost for 1971 would be $4872.

In approaching the problem of turnover, management should keep

records which show what is actually happening to the work force in a plant. The reasons given for quitting FGI over the past six years were:

Return to School	33.7%
Other Job	33.3%
Fiber Glass Bothers Them	11.8%
No Reason Given	9.0%
Moving	4.4%
Dissatisfaction	2.5%
Shift Change/Job Reclassification	2.4%
Military	1.4%
Physical	1.0%
Retiring	0.5%

The reasons given for discharging workers at FGI over the past six years were:

Absent Without Notice	64.5%
Chronic Absence/Tardiness	20.3%
Unsatisfactory Performance	5.9%
Miscellaneous	9.3%

Before remedies can be prescribed for reducing turnover, there must be a clear conception of its causes. The following are some of the factors or conditions which we feel are causing the high turnover at FGI.

a. The Nature of the Labor Market

According to the New York State Employment Office, the Amsterdam area is characterized by a lack of heavy industry. Most of the younger workers prefer to commute to Albany or find work in local construction

where the wages and working conditions are better. The manufacturing companies in Amsterdam are similar in that they are relatively low skilled and relatively low paying. The average manufacturing wage in Amsterdam is between $1.85 and $2.47 per hour. It is an easy matter for a worker to rotate between companies if he hears of a slightly better opportunity elsewhere.

b. Working Conditions

When discussing working conditions we are not referring to physical appearance, although a freshly painted work area can sometimes work wonders. We are referring to things like 11.8% of all the people who have quit over the past six years have quit because the fiberglass bothered them. We are referring to the high rate of accidents and to the lack of opportunity for meaningful social interaction.

c. Training Program

Although FGI conducts on the job training for its workers, there is no formal program for either workers, foremen, or upper management. FGI is not any different from other small manufacturing companies in this respect.

d. Job Evaluation and Wage Incentive System

Approximately 60% of FGI's workers are involved in wage incentives. FGI workers are represented by the Independent Union of Fiberglass and Plastic Industry. We realize management loses much of its flexibility concerning wages and theiradministration when a Union is involved; however, when incentives are being used, they must be continually brought up to date through methods analysis and work measurement. For further comment on incentives see Recommendations II-26, 27 and 28.

The solution to FGI's turnover problem will not be simple, and it

will not be solved overnight. To recommend specific solutions would be impractical; however, there are some generally accepted procedures that, if implemented, could significantly reduce the turnover rate or at least point to specific problems which can be remedied.

Recommendation II - 1. The establishment of a centralized personnel function with specific duties and responsibilities.

a. The personnel office should have specific hiring policies to guide them. It may be necessary in some cases to hire a specific person for a specific job.

b. Every worker hired should be given a detailed orientation so he knows exactly what is expected of him.

c. Statistics on all aspects of the organization should not only be kept but analyzed so as to point out specific problem areas; for example, 11.9% of all the people in the past six years have quit because the fiberglass bothered them. Further examination shows 60% of the people who quit because fiberglass bothered them worked in the Mat Department.

d. Exit interviews should be conducted of everyone who leaves the company no matter what the reason.

Recommendation II - 2. Improve Communications

Within a work organization, communication serves several functions:

a. It transmits information and knowledge between management and employees so that cooperative action can occur.

b. It serves to motivate and direct people to do something.

c. It helps to mold attitudes and impart beliefs in order to persuade, convince, and influence behavior.

d. It helps to orient people to their physical and social environment.

Recommendation II - 3. Even after specific problems are identified, it is not always easy to arrive at a solution. FGI might find that the only way to reduce turnover in the Mat Department is to pay a higher wage to compensate for the poor working conditions, or that some solutions are completely impractical at the present time and that they will have to learn to live with the problem.

Recommendation II - 4. Training programs should be established only when it is felt that they can aid in solving specific operational problems. Training programs for lower management can be very important in improving personnel problems. We recommend the least that should be done is an informal get-together on a regular basis between foremen and upper management.

Problem. The average absentee rate at FGI does not appear to be excessive. However, the increase in absenteeism at the beginning and end of the week does indicate problems related to causes other than sickness.

Analysis. Absenteeism for the first quarter of 1972 at FGI was 4.3% per day. It ranged from a high of 5.1% on Mondays to a low of 2.7% on Thursdays and back up to 4.3% on Fridays. Little is known about the exact causes of absenteeism. However, most management studies have been able to relate absenteeism to working conditions, supervision, age, worker motivation, and distance traveled to and from work. It is difficult to compute the exact cost of absenteeism because of the varying effects one person's absence might have. It is especially difficult to figure the cost of absenteeism at FGI where the absence of one man can affect the operation of several machines or the reshuffle of personnel resulting in less experienced workers in critical jobs, job delays, and increased administrative costs.

FGI's absentee rate of 4.3% does not appear to be excessively high when compared with other manufacturing companies. Most manufacturing companies' absentee rate falls between 3.5% and 5.5%. The significant

and suspicious increase in absenteeism on Mondays and Fridays compared with the mid-week low is an indication that FGI does have a problem with absenteeism and that through positive efforts FGI's absentee rate could be significantly lowered with a resulting cost savings to the company.

The causes of absenteeism are usually related closely to those which are responsible for turnover. Procedures aimed at reducing turnover will tend to reduce the rate of absenteeism. Some specific preventive measures which might be taken to reduce absenteeism are:

Recommendation II-5. Anticipate in-plant and community problems which may affect employees and plan in advance to overcome or to minimize such problems.

Recommendation II-6. Foremen can help reduce absenteeism. It is important that the first-line supervisors follow a uniform procedure and penalty policy concerned with absences.

Recommendation II-7. Analyze absenteeism on a regular basis in order to develop a realistic pattern and take concerted action.

Problem. Almost 25% of the work force at FGI is within five years of retirement.

Analysis. The age distribution of FGI workers as shown in Figure II-1 indicates several problems. Within the next 5 years, 21 members of the work force will reach retirement age. Not only will it be difficult to replace these people, but FGI will lose much of the stabilizing influence of experienced people, many of whom have been with the company from its beginning. Departments must also be looked at as to age distribution; for example, four out of nine people presently employed in the maintenance department will reach retirement age in the next five years. See Figure II-2.

The human resources of any organization constitute one of its most

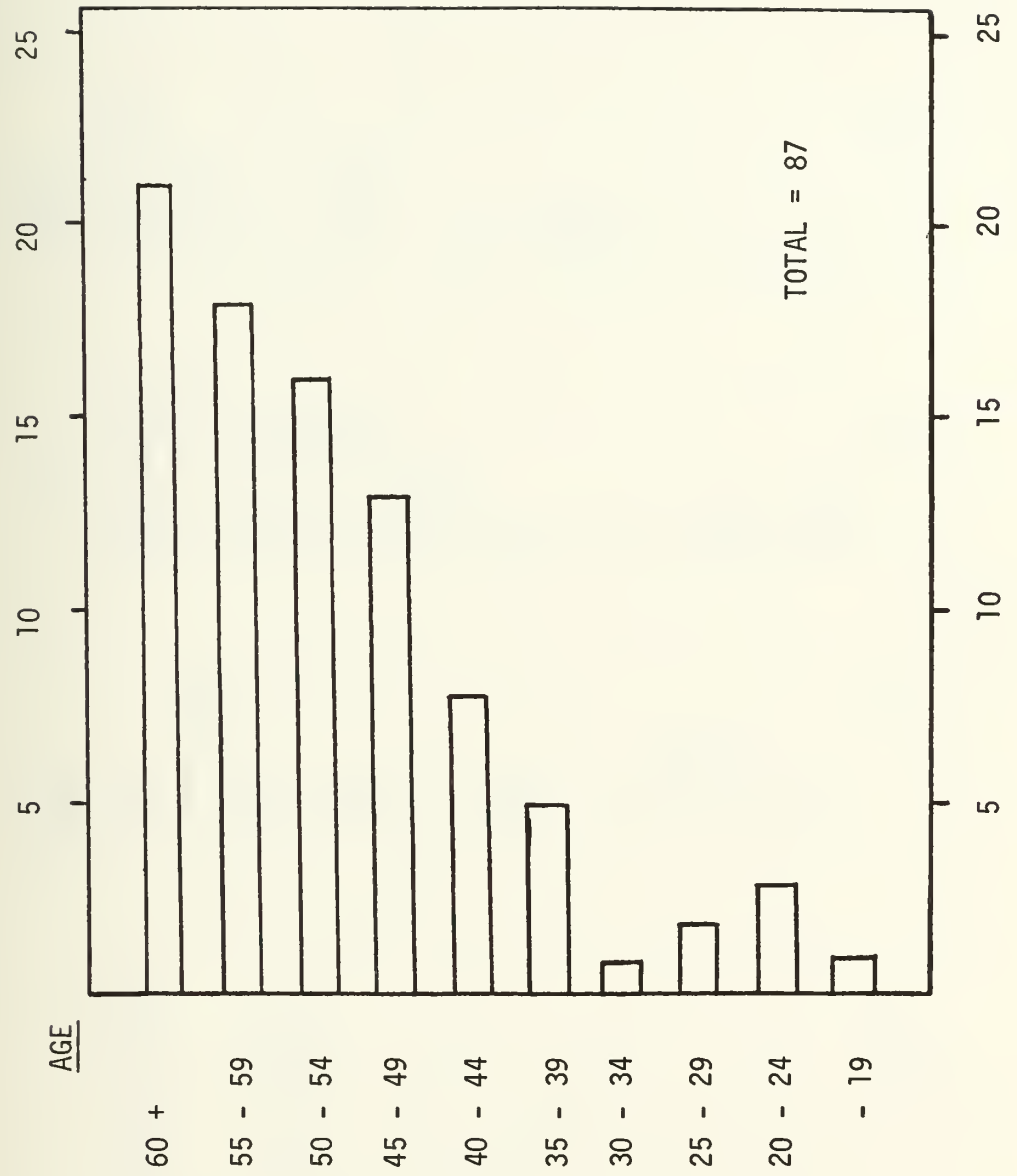


Figure II-1 FGI AGE DISTRIBUTION

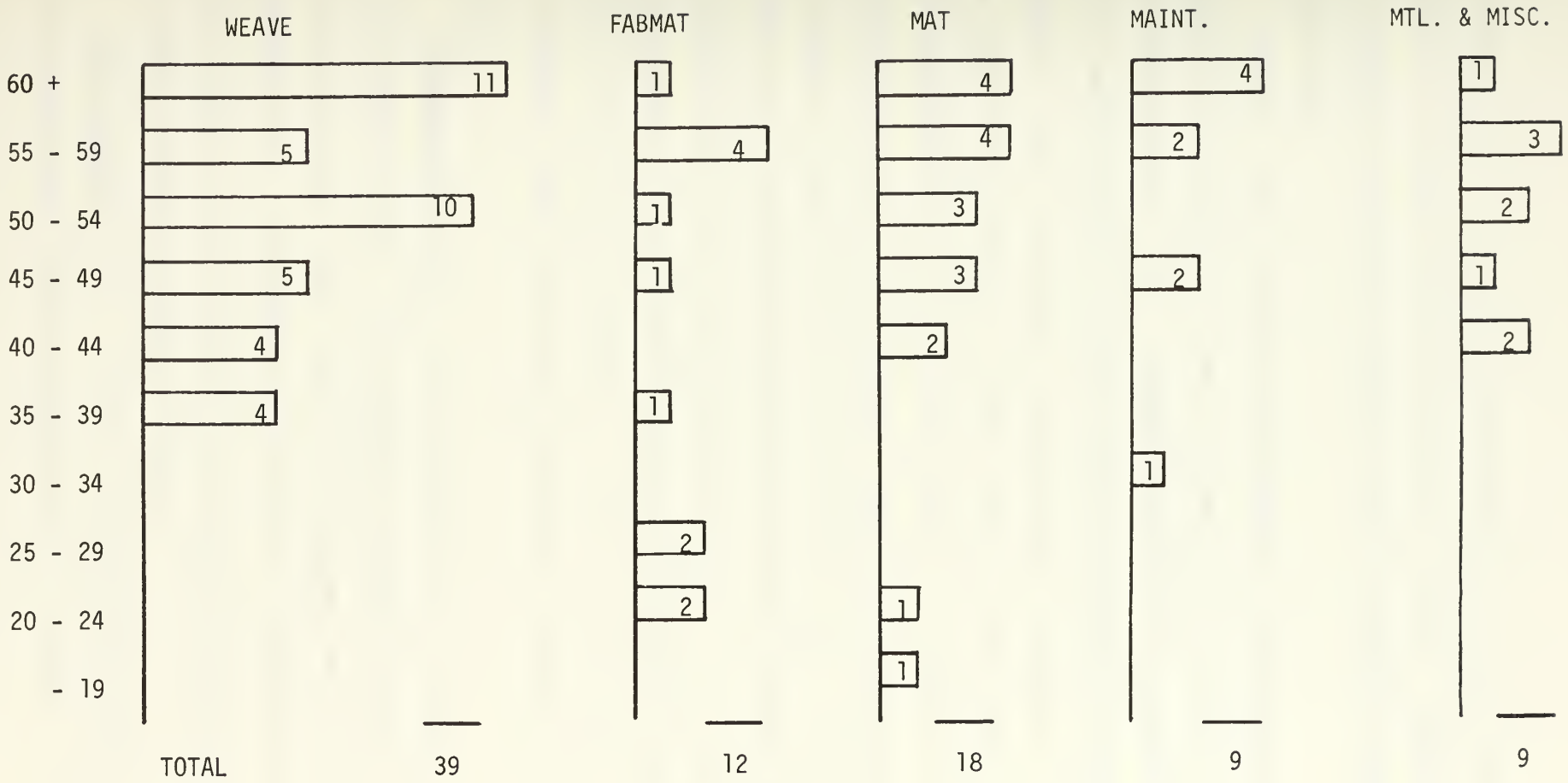


Figure II-2 FGI AGE DISTRIBUTION BY DEPARTMENTS

important assets. Its successes and failures are largely determined by the caliber of its work force and the efforts it exerts. Therefore, the policies and methods an organization adopts to meet its manpower needs are of vital significance.

In FGI's case, we realize the difficulty in hiring and keeping the younger worker; however, we feel a concerted effort should be made to lower the average worker's age. Montgomery County has the problem of losing many of its younger workers to nearby companies like General Electric; however, there is, across the nation, a growing number of workers in the 40-to-50 age group looking for work. Studies have shown that there are advantages and disadvantages in hiring the older worker. In the age group 55 to 64, the productivity of men drops slightly. However, the productivity of the under 25 worker has also been proven to be slightly lower. Although it has been proven that older workers have no more accidents than other workers, what accidents they do have tend to be more serious. It is conceded that the older worker has less strength and speed, and some tasks require more of these qualities than he possesses. It has also been proven that absenteeism and turnover rates for the over 45 worker are much lower than for the younger worker.

Recommendation II-8. At the present time, FGI has only eight workers in the 40-44 age group. We recommend an attempt be made to hire more workers in this middle-age group. Planning for manpower needs must be done on a continued basis. Management must be aware of areas where experience levels might become critical and take steps to insure trained personnel are available to replace the ones who leave or retire.

Recommendation II-9. Specific hiring policies should be established as to recruitment, selection and placement of personnel. These policies

should reflect the long range goals of the company as to the nature of the work force desired and the rate of growth of the organization.

Problem. Accident and injury rates at FGI are well above the state-wide averages.

Analysis. The FGI plant accident and disabling injury experience over the last five years is shown in Table II-1.

Table II-1.
Accident and Disabling Injury Frequency and Severity

Year	1967	1968	1969	1970	1971
Accident Frequency Rate	37.2	54.6	50.0	19.1	24.9
Accident Severity Rate	274	413	350	120	267

The Accident Frequency Rate (number of accidents per one million hours exposure) is exceptional. For comparison, the average frequency rate for all New York manufacturing companies was 13.7 and for all manufacturing companies with 100 to 249 employees the rate was 20.4. For information, a detailed breakdown of accidents by department and by type of injury is provided in Appendix II-1.

The cost of this high accident rate must be measured by two components, the costs covered by insurance and the uninsured costs. The uninsured costs are difficult to measure except by costly research, however, Department of Labor studies have shown that uninsured costs average four to five times that of insured costs in a company the size of FGI. Indirect costs consist of

Lost time of the injured worker

Time spent by supervisors in assisting the injured man

Time spent by supervisors in investigating the accident

Lost production

Damage to material or equipment

Administrative expenses in processing paperwork.

An additional consideration that can not readily be measured is the impact of the health and safety environment on worker satisfaction and morale which may influence job performance, personnel turnover, and the company's attractiveness in the labor market. The accident frequency rate considers only disabling injuries or accidents in which there is more than one day of lost time. Of significance to the worker is the number of all accidents that require medical attention. These accidents are tabulated in Appendix II-2.

The drop in the accident frequency rate over the past two years is encouraging. Efforts to minimize the adverse effects of fiber glass on the body by providing goggles and silica gel have been noted. Nevertheless, the accident rate remains high, the protective equipment appears to be rarely worn, and the lack of a visible safety program is apparent.

Recommendation II-10. Assign formal responsibility for safety to direct supervisors and assign responsibility for the overall co-ordination of the safety program to a higher level supervisor.

Recommendation II-11. Establish, promulgate, and enforce realistic protective equipment requirements for each job. Particular emphasis should be given to jobs which require safety goggles and safety shoes.

Recommendation II-12. Continue the program of constructing guards on machinery and establishing walkways in the plant.

Recommendation II-13. Post safety regulations for operating hazardous machinery in the vicinity of the machines.

Recommendation II-14. Establish a program to reduce the number of overflowing drip pans and clean up scrap and packaging accumulation areas.

Recommendation II-15. Establish a formal safety program to include: job safety analysis, accident analysis and tabulation, and education and training.

Problem. At the present time, FGI lacks a formal personnel management program.

Analysis. The formal components of a personnel manager's job are listed in standard texts as follows:

1. Employment
2. Transfer, Promotion, and Layoff
3. Training
4. Wage and Salary Administration
5. Health and Safety
6. Discipline and Discharge
7. Labor Relations
8. Benefits and Services
9. Organization Planning
10. Manpower Planning

This study has identified problems in 8 of the 10 areas above. It is apparent that correction of these problems and maintenance of a satisfactory program in each area is a full time job. As is usually the case with companies of FGI's size, no one in the organization is assigned this job. FGI is at the awkward size at which it is too small to afford a full time personnel manager, but too large to do without one. As a rough rule of thumb, personnel departments in manufacturing companies have .6 to .9 personnel men for each 100 workers. Under this rule, FGI has reached the size that it "almost" needs one full-time manager.

Recommendation II-16. That the company consider the establishment of a personnel (Industrial Relations) department as the next step in its organizational development.

Recommendation II-17. That as an interim measure, each of the ten areas

of the personnel function be assigned to individuals in the company.

Problem. The responsibilities and authority of a foreman are inconsistent with respect to the discipline of personnel.

Analysis. Included in the responsibilities of the foremen are the discipline and training of personnel and labor relations on a first level basis. Undoubtedly, the morale of the work force will have a direct effect on the quality of labor relations to be enjoyed by the company. Good morale can only be maintained by affecting a balance between rewards and discipline. Discipline that is not uniformly applied to cases of delinquent performance can only have a negative effect on those employees who would normally give the company a fair day's work.

At present, the disciplinary system, as perceived by foremen and workers alike, is not strictly applied. It is the opinion of many that the third disciplinary slip submitted on a worker will somehow get "lost." In some instances, workers discharged have later been rehired, supposedly for economic reasons.

Recommendation II-18. Top management must support the disciplinary actions of first level supervisors if these supervisors are to continue to be responsible for the performance and discipline of their men.

Problem. The present work force organization is incompatible with the assigned responsibilities of the foremen.

Analysis. At present, the six foremen are organized both on a process basis and a time basis. There are four foremen on the day shift who are in charge of Weave, Mat, Shipping, and FABMAT, and there are two foremen who are in charge of the entire second and third shifts. As seen by the plant manager, the responsibilities of these six men include: (1) production supervision, (2) cost reduction, (3) assignment of personnel, (4) training and discipline of personnel, (5) labor relations, and (6) safety and house-

keeping. Two problem areas, one current and one future, arise from this organization.

At the present time, weavers can be assigned to work under any of four foremen, under two department heads, on three shifts. It is not realistic to think that these four foremen will feel directly responsible for the weavers that are actually producing for them at any given time. Additionally, should a conflict of interests arise between departments because of the number of orders being processed, the resolution of the conflict may not necessarily be in the best interests of all concerned. This is because the final allocation of weavers is now made on the basis of discussions between two levels of management, i.e., between a foreman and a department head.

At present levels of operation, the second and third shifts are almost exclusively FABMAT production. In the future, expanded operations may require that the Weave and Mat Departments also employ multiple shifts. In that event, the scope of operations may become too great for one foreman to be responsible for the entire second or third shift. (It may become necessary to assign foremen to these shifts on a process basis as is done now on the day shift.)

Recommendation II-19. Place the responsibility for assigning personnel on a supervisory level that has commensurate authority for making such decisions. If foremen are to assign personnel, let this be done consistently throughout the plant.

Recommendation II-20. Strive to achieve an organization in which each man is assigned to one superior. One way to do this would be to assign a group of weavers to the FABMAT Department on a permanent basis. While the rotation of shifts would still bring these men under different foremen, they would always work for the same department head, thereby eliminating conflicts of interest between departments.

Recommendation II-21. As future operations require more production on second and third shifts, organize all foremen on a process basis, as is done currently on the day shift, and hire or promote the necessary additional foremen.

Problem. The lack of a replacement foremen is delaying a planned organizational change.

Analysis. Transfer of the third shift foreman to a position under the Maintenance Department Head has been delayed due to the lack of a qualified replacement. There apparently has been no formal policy of identifying potential foremen in-house and providing them with training so that talent would be available to fill vacancies. Although many employees are approaching retirement age and seniority is not a prerequisite for selection as foreman, there has been no effort to employ men with leadership potential in order that they might gain production experience and be ready to step into foreman positions as they become vacant.

Recommendation II-22. Identify present employees who have the ability to perform as foremen. If these men lack knowledge in specific areas, arrange for training from community colleges or through manufacturing associations. (This is,of course, dependent on their willingness to accept the responsibility.)

Recommendation II-23. Recruit limited numbers of personnel with supervisory potential for the expressed purpose of gaining production experience prior to filling vacancies due to retirement. Such hirings could precede anticipated losses by a short period of time and would result in little additional cost but would provide continuity.

Problem. The lack of specific skills prevents full utilization of production capacity and makes scheduling inflexible.

Analysis. The situation exists in which production on certain equipment

is restricted by the number of skilled operators available to run them. As an example, there are only 5 operators for the Ivers looms and 3 full-time operators for the Picanol looms. Since this limits production to one shift per day, the utilization of capital invested in these machines is at best 33 percent. Additionally, longer periods of time are required to fill the orders to which these machines could contribute. In the final analysis, the annual production of FGI could be more limited by personnel than by equipment or space restrictions.

Although there is no formal training program as such at the present time, it is unlikely that present employees could not be taught the necessary skills. Rather, there has been a refusal on the part of employees to learn. This can only be because it is not to their economic advantage to acquire new skills.

Admittedly, the problem of finding good workers who will remain with the company after learning the necessary skills is a difficult one. The labor supply that remains in the area surrounding FGI is apparently highly transient, changing jobs at every opportunity to make a few cents more an hour. The upper stratum of labor has been drawn off by out-of-area industry that pays more and can offer training in skills that are more widely applicable. In light of this situation, FGI must strive to improve those factors that will induce a worker to remain with the company. (Also see Recommendation II-29).

Recommendation II-24. Evaluate the increased profitability to be had if the under-utilized equipment in question could be more fully utilized. Re-evaluate the compensation and incentives that are offered to operators of these machines, and in light of the profitability study, adjust the compensation and incentives in order to make it advantageous for workers to learn the necessary skills.

Recommendation II-25. Investigate sources of labor with the idea of recruiting workers for specific positions. Such sources could include vocational programs, handicapped workers, and government programs to locate employment for the disadvantaged and members of minority groups.

Problem. The incentive program is a source of problems, and its effectiveness is an unknown.

Analysis. The incentive program was initiated 4 years ago in an attempt to improve the efficiency of the weavers. Since that time there have been several changes in the conditions and methods of work, but there has not been a new work study to verify the equality of the incentives. There have also been changes in the basis of computation of some incentives, and some workers have been removed from the plan. Incentives continue to be a source of some discontentment. Workers want changes because they feel others hold them back and keep them from producing or because they feel they have to work harder for what they earn. Additionally, the attempt to even out the incentives earned contributes to the shifting about of personnel.

Recommendation II-26. Acknowledging the need to have a man's compensation keyed to his productivity, the incentive plan should be continued if it is determined that the additional wages are justified by the amount of production over and above the base levels.

Recommendation II-27. Have a new work measurement study done to verify the present incentive rates or provide a basis for new rates.

Recommendation II-28. Consider the addition of industrial engineering personnel. Compare the costs of having full-time personnel at FGI and of hiring consultants on a case basis.

Problem. There are apparently few aspects of FGI, as a workplace, which are satisfying or motivating to workers.

Analysis. Wages paid to production workers at FGI are not out of line with wages paid by other industries in the vicinity of Amsterdam, New York. Despite this fact, FGI is plagued with a relatively high turnover rate (greater than 30% for 1971). In addition, absenteeism and tardiness of workers are chronic problems. Most behavioral scientists would agree that there is an inverse correlation between worker satisfaction and the levels of turnover and absenteeism. If this is true, one would have to conclude that worker satisfaction is relatively low at FGI.

One aspect of the workplace which is found to be important to worker satisfaction is the opportunity for interaction with other workers. There evolves a social side to work which may manifest itself in small work groups with their own norms and natural leaders. Such groups exert an influence on their members with regard to performance and also provide an opportunity for after-hours social activities. These work/social units are apparently absent at FGI or, at least, they are not known by supervisory personnel.

Although the recognition of the symptoms of worker dissatisfaction may be easy, identifying the underlying causes is quite another thing. One contributing element may be the practice of shifting some workers about to equalize incentive opportunities, to rotate shift assignments, and to meet changes in production. As a result of this, the men work at different time of day, for different men, with different men. This instability in the conditions of employment may prevent the social interaction that is important to satifaction.

Another contributor to workplace satisfaction is the opportunity to do a "whole task." Under present manufacturing conditions, however, it would be difficult for any one individual to have a part in more than one stage of the manufacturing process. It is important under these circumstances

for an individual to identify with a particular department or group that does process a product from start to finish. In this way, a man can at least feel that he is part of a team effort.

At its inception, FGI enjoyed the comradeship of its workers. They were part of a small firm, struggling to make a go of a business that the parent company had decided to drop. They were willing to make some concessions to the company. This loyalty cannot be taken for granted in 1972. Many new employees have no particular feeling for the company. The longer-term employees have seen the firm grow at a rapid rate and feel that it is now time for the company to take care of them.

Recommendation II-29. Institute a formal personnel program with a knowledgeable, imaginative head. This program need not have a high cost. The important thing is that there is such a program and that the workers know it. The program could include such things as:

a) a periodic employee newsletter that acknowledges retirements, milestones such as 10 years or 20 years employment, new employees, new member of management, etc. This newsletter could also inform employees of conditions within the fiberglass industry.

b) competitions between departments to emphasize production efficiency, safety, attendance, or any other thing that it is desired to stress. This would help workers to identify with their departments and create a team effort.

c) awards for high production, long employment, or other significant contribution to FGI.

d) a public relations effort that puts the name FGI in the newspapers and other media. This could do much to make a worker proud of his association with the company.

e) more than one social event annually for the employees.

f) company sponsorship of an entrant in a local bowling or softball league.

The administration of the personnel program would probably require enough time so that it could not be assigned as a collateral duty. It is conceivable that a present staff member could run the program if a sufficient number of other duties were lifted.

Recommendation II-30. Reduce or eliminate the shifting of personnel because of shift assignments or the incentive program. This may require a reorganization of the work force and a reevaluation of the incentive plan. In any event, an effort should be made to stabilize work relationships.

Recommendation II-31. Where possible, enlarge jobs to include more activities that are required to produce a finished product. An example of this would be to train one man to operate both a loom and a FABMAT machine. If one man ran each machine combination, the number of employees wouldn't change, but each man would be solely responsible for the quality and quantity of the product. Such a recommendation should also be weighed in conjunction with the productive efficiency.

APPENDIX II-1

Disabling Injuries and/or Lost Time Accidents

Breakdown of Accidents by Departments

Year	67	68	69	70	71	Total
Production Depts.	5	11	14	3	4	37
Mat'l Handling	0	0	1	1	0	2
Maintenance	3	1	2	0	0	6
Office	1	1	0	0	1	3
Other	0	0	0	0	0	0
TOTAL	9	13	17	4	5	48
Number of employees	117	115	164	106	104	
Hours Worked	240,678	239,077	341,658	208,144	200,805	1,230,363
Frequency rate	37.2	54.6	50.0	19.1	24.9	39
Severity rate	274	413	350	120	267	295

Breakdown by Type of Accident

Year	67	68	69	70	71	Total
Rashes & Skin Irritation					1	1
Foreign Objects in eyes/nose		1	3		3	7
Slips, Falls[1]	2	2	5	1	1	12
Machinery[2]	1	4	3	3		11
Tools[3]	2	1				3
Strains	4	2	3			9
Vehicles[4]						
Miscellaneous		3	3			6
TOTAL	9	13	17	44	5	48

PART III

PRODUCTION AND MANUFACTURING

A. Summary

The production and manufacturing section deals with policies, procedures, and techniques used at the FGI plant in Amsterdam, New York. The approach is from an industrial engineering point of view, and attempts to increase efficiency and cut costs in the manufacturing processes.

The plant is set up in a "job order" system. It is neither a job shop, nor a continuous line system. It is a combination of these two processes. The key concept in such a system is control. Production control is perhaps the most important function in such an organization, and it depends on an effective and concise information system from the plant, as well as other functional areas of the company. More efficient production control can bring about better scheduling, decreased costs, lower variances, and provide the flexibility required by the "job orders."

The proper use of incremental analysis in determining opportunity costs enables the company to calculate the amount of net cash inflows that must be sacrificed in order to divert an input factor from one use to another. Such analysis is an effective aid in management and production control decisions, and puts a dollar value on alternate courses of action.

Due to the fact that FGI's market share results from their flexibility in manufacturing to meet customers' specific needs, the section will adapt the present plant and its functions to this required flexibility in a more efficient manner.

The ultimate responsibility for production and its control rests with the plant manager, and not the sales personnel or sales manager. Problems of scheduling and control which bring about conflict between sales and production should be resolved at the upper level of management. Members of the sales force have no authority to control or schedule any functions of produc-

tion, and conversely manufacturing problems affecting sales should be cleared through the plant manager before they are discussed with sales.

Another result of effective control in the manufacturing processes is that planning on a short or long range basis can be accomplished and, in the long run, can help eliminate the day to day crises which may unnecessarily take much of management's time. Management by quick reaction to crisis is characterized by short range solutions which, over the long run , may adversely affect the company. Proper planning can eliminate much of this.

B. Analysis and Recommendations

Problem. The plant is in a state of disorder in many areas.

Analysis. Due to the clutter and confusion of raw materials, finished goods, scrap, and spare parts and machinery, space utilization is inefficient. Control of costs is more difficult due to poor control of goods, and devising an effective management information system is an almost impossible task. In most areas of the plant approximately 30 percent of the production space is not being utilized properly.

The annual cost per square foot of production space is 48.5 cents. This figure includes all production floor space, rent, electricity, gas, water, and insurance. This figure is low in that it does not take into account unuseable dead space around columns and machinery. A more reasonable estimate of actual cost would be approximately 55 cents per square foot.

Space utilization may not be critical to the company today; however, as production increases, and as plant capacity is approached, inefficient use of space could force the company to relocate its plant one to two years earlier than necessary. Thus proper forecasts for plant expansion or a new plant cannot be accurately calculated with the present condition of the plant.

Recommendation III-1. A general program to clean up and put the plant in order should be initiated.

Problem. Plant layout is inefficient and material handling costs are higher than necessary.

Analysis. One solution which is of great hlep in the area of space utilization is a better plant layout to minimize handling costs, provide for better inventory control, and improve control of in-process and finished goods.

Lower material handling costs can be achieved at present production levels, as space is not presently at a premium. If these costs are looked upon as a function of the distance goods move and the number of loads moved, then the basic solution is to place production centers and storage areas for raw materials and finished goods in close proximity. The number of loads can also be reduced by better loading techniques.

If storage areas were provided adjacent to their production centers, incoming raw materials could be routed directly to the proper manufacturing area, thus reducing handling costs caused by temporary storage in a centralized inventory area. This would be applicable to all raw materials.

With such a system of small inventories of materials, one man would act as a material handler for each production center. He would be responsible for supplying the looms, doffing the finished rolls, and packing the rolls for shipment. Periodically, personnel from shipping and receiving would pick up the goods from the centers in order to assemble the complete orders for shipment. They would supply the incoming raw materials to the centers. The material handlers would also be responsible for scrap recovery, and would store it until shipping and receiving came to pick it up for movement to the Mat Department.

A storage area for scrap glass is needed near the garnet machine on the second floor of the 57 building, where the pattern tables are presently located. If these tables were moved to the adjoining area of the 70 building,

then the work flow would be smoother as the incoming scrap glass would be located near the choppers, and the finished products would be near the cutting tables when needed. Since these tables are not used very often, a fold-up design should be used to permit use of the space for other projects if necessary.

One other area of concern is the scrap heap of spare parts which is located on the fourth floor of the 57 building. Every square foot of spare parts costs 55 cents per year in holding expenses.

Presently spare parts are purchased, and if the part is not available, then one is manufactured or reclaimed from the spare parts heap. With this policy, an inventory should be conducted to identify those parts still of use to the company. All other parts should be sold as scrap or salvage. Those which are kept should be tagged and stored for ease of recovery.

The possibility exists that the purchase policy is in reality caused by the lack of knowledge of available spare parts, as well as high recovery costs due to the manner in which they are stored. With better control of the spare parts situation, maintenance costs may be saved, and extra floor space will be available for use.

One problem arises when inventories of materials, as well as production centers,are scattered throughout the plant. This is lack of knowledge of where things are. Control of the flow of materials, in-process, and finished goods is impossible unless items are designated by product, quantity, and location.

A possible aid in control is an area numbering system which identifies each specific manufacturing, and storage area. This is accomplished by a number-letter system that indicates the building, floor, and sector of the floor. In this manner each area is designated in a simple, clear and concise manner.

Recommendation III-2. Plant layout should be designed to maximize work efficiency and minimize material handling costs.

Recommendation III-3. Decentralized inventory areas should be established.

Recommendation III-4. A central storage for scrap glass to be recycled should be established.

Recommendation III-5. The spare parts should be inventoried, and only those having potential for use should be retained.

Recommendation III-6. An area numbering system for floor space should be established.

Problem. An efficient management information system is not in use in the plant.

Analysis. The preceding section sets the stage for implementation of an information system that will enable the plant manager to have an up to date record of all the manufacturing activities. Figure III-1 is a copy of a suggested form for such a system. It is adapted from an informal system presently used by Foreman Ray Butkus. It could be printed on NCR paper to make carbon unnucessary and simplify the work required by the foremen.

Each morning, on their initial rounds, the day foremen would fill out the status of each machine and each outstanding order. This would be done in triplicate, one copy would be forwarded to the plant manager via the respective department head, one copy would go to the shipping and receiving manager, and one copy would be kept by the foreman concerned.

This format would provide the plant manager with an up-to-date status of the orders and the machinery. It would aid in scheduling, and assist those concerned with meeting production demands. It would also enable top management to control and supervise, and it would provide inputs for short range planning as well as basic policy decisions.

The shipping and receiving manager would be able to plan the movement of raw materials and finished goods more effectively. With inputs from the

DEPT: FOREMAN: DATE:

MACH						
M.O.-STAT						
TYPE						
WIDTH						
REQ COMP						
EST COMP						
L.R.REQ						
RFP-LOC						
PFS-LOC						
RFS-LOC						
MACH						
M.O.-STAT						
TYPE						
WIDTH						
REQ COMP						
EST COMP						
L.R.REQ						
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TYPE						
WIDTH						
REQ COMP						
EST COMP						
L.R.REQ						
RFP-STAT						
PFS-LOC						
RFS-LOC						

COMMENTS:

MANAGEMENT INFORMATION FORM FIGURE III-1.

production foremen, he would be able to plan movements of the goods in advance, and thus could allocate his manpower in a more efficient manner, thereby cutting down handling costs.

The shipping and receiving manager should also have raw materials and finished goods on inventory cards that identify not only the type and amount of material, but the various locations of these goods as well. He would be able to re-allocate raw materials or finished goods as the situation may demand. In this way overstocking of raw materials or finished goods would be held to a minimum.

Recommendation III-7. A form such as Figure III-1 should be used for production control information.

Problem. Inventory control and shipping and receiving need a full time supervisor.

Analysis. The job of supervising shipping and receiving, purchasing, and inventory control is a full time job for one man for overall effective control. In the present situation this is one of the many duties assigned to a department head who is also responsible for a phase of production. An inventory manager should be able to concentrate his efforts on this one job and thus provide better control and coordination with the manufacturing centers. This would also centralize the flow of information as to the current status of all raw materials and goods in the plant.

For raw materials that are ordered on a regular basis due to a constant demand, economic order quantity (EOQ) formulas should be used in determining their ordering policy. A full explanation of these formulas is too lengthy for the report, however they can be found in most production textbooks. The EOQ concept is designed to minimize ordering and inventory holding costs, to satisfy lead-time requirements, and to take into consideration price breaks that are available for large order quantities.

Presently 150,000 pounds of finished goods are sitting unsold on the fifth floor, and are valued at approximately $75,000. Although they only represent about one percent of total production efforts for one year, they are tying up a considerable amount of capital that could otherwise be invested elsewhere. Due to holding costs, an additional loss is incurred each day they sit in storage.

Two approaches can be used to solve the problem. First, an up to date inventory information system could inform sales about goods that are needed to be moved. After a certain period of time, price discounts could be allowed to stimulate their sale. A cut-off date should also be established, after which these goods could be recycled or cut to new specifications in width for other orders. Even if these goods must be sold or recycled at a loss, this would partially offset expenditures for new materials purchases.

Another approach to eliminating this situation is to have a fixed production schedule for blanket orders (which are the cause of the bulk of the unsold goods). In this way the goods would not be manufactured far in advance of delivery dates. In the event of cancelled orders, the company would not have large amounts of these goods on hand.

Recommendation III-8. A full time manager should be responsible for inventory control, purchasing, and shipping and receiving.

Recommendation III-9. EOQ policies should be adopted for constant demand goods.

Recommendation III-10. A sales and manufacturing policy should be implemented to minimize unsold goods and move them out of the inventory

Problem. The quality control policy is too lax and informal.

Analysis. Quality checks on goods are usually visual in nature and are left up to machine operators. Weights of finished rolls are recorded on daily records, but it appears that they are infrequently checked. In one

instance the forms on a foreman's desk in early April had been accumulating since the last week in December. In cases where the operators are too busy, the checks are made less frequently, sometimes only once per shift. Such an approach to quality control has a negative effect on the total program. For instance, if customers reject just one percent of goods received due to poor quality, it would mean a return of $57,000 in goods. A one percent increase in the amount of raw materials (based on the 1971 P&L statement) used in manufacturing due to poor quality control would amount to an extra yearly cost of $18,200. These figures are only used as benchmarks to indicate the seriousness of the quality control problems that can result due to a poor program.

A vigorous program must be instituted to tabulate the overall quality and quantity of finished goods on a continuous basis. Records should be kept by machine in order to check and identify manufacturing variances. By early evaluation of trends, serious loss of time and money can be prevented. A limit on adjustment time for machinery could be established to prevent an operator from spending too much time keeping a product within tolerances. If this limit is exceeded, permanent repair of the machine can be performed by maintenance personnel. If repair costs, over the long run, increase product costs, purchase of a new machine is in order.

Quality checks should also be made by the lab on a regular basis to supplement the weight checks by the operators. This will assist in the timely identification of trends. All checks should be tabulated on a daily basis since old information will not be pertinent to the existing situation.

Recommendation III-11. A vigorous and continual quality control program must be instituted to analytically assist in reducing material and maintenance costs.

Problem. Material recovery is not emphasized or minimized in all areas of production.

Analysis. With material costs equal to 75 percent of total production costs, the impact of improvement in this area is quite evident. Effective scrap recovery systems should be emphasized for they represent a substantial potential savings to the company.

The present resin recovery system is a difficult one for the machine operators. A single mechanized sifter could effect easier and cleaner, if not cheaper recovery than the $275 sifters that are being considered for the present FABMAT machines. Simple collection chutes that empty on one side of the machine could be installed to collect the chopped glass and resin mixture. Once this has been done, it can be collected from the chutes and dumped into the mechanized sifter for periodic processing. The present hand system of reclaiming costs almost as much as a new barrel of resin. This simplified system could cut reclamation costs since less time and labor would be needed to perform the operation. The present system has also brought about a large backlog of resin to be sifted (approximately 1,300 pounds) due to the fact that it is a time consuming as well as dirty job which is only done by the FABMAT personnel when extra time is available.

Scrap glass recovery is usually accomplished by storing scrap in boxes. If too large a backlog builds up, it is baled by an outside contractor for 1 1/4 cents per pound. The estimated price of a baler is $6,000 which represents 480,000 pounds of work done by the contractor. This seems to preclude the purchase of a baler at this time. However, should the volume of scrap increase to the point that material handling costs are effected or needed space is occupied, then the purchase of a baler is justified.

Recommendation III-12. More emphasis should be placed on a material recovery program to save material, cut handling costs, and for better space utilization.

Problem. Quality of surface mat is too poor to merit sale as an end product.

Analysis. Present surface mat production on a one shift basis is providing mat for internal use only. Sales forecasts indicate a market for the product, however, the present quality of the mat is not high enough to warrant increased production.

The problem stems from the reliability of the glass ovens which range from 10-40 days of satisfactory operation before they must be replaced at a total cost of $240 for parts and labor. The glass ovens are presently being brought up to operating temperature in a short 1 1/2 hours. The manufacturer suggests that the ovens be operated continually, and if they must be shut down, they should be brought up to temperature gradually. The cause of poor oven performance may very well be caused by the way the ovens are presently being operated.

If serious consideration is being given to full time surface mat production, then three shift operations over a two month period of time should commence on a test basis. This would enable the ovens to be operated according to manufacturers specifications. This period of time would allow the company to determine if the oven life will increase with continuous operation, and to see if this method will result in a higher quality mat. Trends in mat quality will probably be noticed in the first few weeks of operations. However, close and consistent quality checks must be maintained on the mat. A record of oven life should be kept as well. With a production cost of 36.3 cents per pound and a selling price of $1.10 per pound, surface mat production can be a very profitable venture.

Recommendation III-13. A two month, 24 hour surface mat production test should be instituted to determine if FGI has the capability of producing saleable mat.

Problem. The FABMAT (c) and Weave departments are effecting efficiencycausing improper utilization of manpower, machines, and capital, and inhibiting proper scheduling.

Analysis. The present set up of the FABMAT (c) and Weave departments denies the company the flexibility it needs. Additionally, greater production potential could be realized by using a different layout.

The proposal is to consolidate 24 looms for making ROVCLOTH, from the Weave and FABMAT (c) departments, as well as the 5 looms that are presently set up (but have not been in use for over a year) into one single department. This Weave department would weave Rovcloth for use as an end product or as an intermediate product for FABMAT (c) production. The looms should be set up into four different "six-pack" layouts under the control of one foreman.

The eight Fabmat (c) machines are to be set up into four working units of two machines apiece. Then they would process the rolls of ROVCLOTH into FABMAT (c). These machines would be under the jurisdiction of one foreman.

With four "six-packs" all weavers would be operating three looms, thus increasing the productivity of the present FABMAT weavers by 50 percent. The maximum increase in labor costs for these men would be on the order of only eight percent.

The looms that are presently not being used would be put into operation, which would improve capital and machine utilization. They now represent a capital investment that is not now contributing to production.

The rolls of ROVCLOTH that are slated for FABMAT production could be increased in size to 125-150 yards each, plus an additional amount on the end

to allow for overlap for continuous feed into the FABMAT machines. This would eliminate 80% or more of the handling costs of doffing smaller rolls to go to the FABMAT machines.

The present FABMAT machines have the capability of operating at a speed of approximately three times that of the looms. In the present set up they are not producing to their capability and thus only 33% machine utilization results. In the proposed configuration each FABMAT machine would operate at full capacity. Automatic controls could be installed to start and stop the machines. The mechanical feed could be linked with a temperature-sensing device which would eliminate scorching or non-bonding of the glass mat. This would permit the higher temperatures required to run the machines at higher speeds.

Tension rollers could be installed at the feed of each machine to regulate the drag necessary for quality operation. New rolls could be clamped or stitched to the end of the old roll, thus eliminating the need to feed a new roll into the machine every 125-150 yards.

The increased speed of the FABMAT machines would, in all probability, require one operator for each machine instead of the single operator as presently employed for every two machines. However, due to the increased production rate, each man would be producing 50 percent more per hour than at present.

Material handling costs could possibly increase with such a layout, but with proper planning they should approach the present levels. The cost of transporting ROVCLOTH to the FABMAT machines could be kept to a minimum by having the two manufacturing units located in close proximity and by the use of small flatbed handcarts on rails,or a separate overhead monorail system. Savings in handling costs could come about from having centralized raw material

storage for the looms, and another for FABMAT machines. In this way the total number of handlers would remain at the present level, or possibly could be decreased.

Increased production rates may possibly allow a decrease in the number of shifts required to meet a given production schedule. This would result in a savings in shift premiums and overhead costs.

The flexibility of the proposed layout is probably the most attractive point. With 24 looms set up, all basic weights of roving can be loaded in the creels. Only small adjustments in the ends for spacing or changes in widths and the changing of the roving in the shuttle would be required. Most of the time-consuming set ups presently required could be eliminated. The FABMAT machines would only need adjustments for the overall width of the roll of the ROVCLOTH.

With proper scheduling, costly delays, overtime costs for set-ups, and the number of dissatisfied customers can be minimized. Small rush orders would not disrupt production because there would be a high probability that the desired set-up would already be in use on one of the machines.

This proposal is a long range plan, and to be accomplished, time and money are required. The solution here is simplified, yet the skills and experience of those involved in the manufacturing process are sufficient to put the system to work. The method would provide a capability for greater production volume due to higher production rates, and, through increased efficiency, an appreciable gain in gross margin is feasible. ROVCLOTH and FABMAT (c) amount to 71 percent of total production, and contribute to 69 percent of the company's sales. Any improvement in the profit picture of these products will have a large impact on the company.

Recommendation III-14. The Weave and FABMAT (c) departments should only operate as separate job shops. Increased flexibility and production will

bring about a savings in production costs.

Problem. Technical assistance needed in the area of industrial engineering is only available to FGI through consultants.

Analysis. Due to the shortage of time and experience, only major problems have been approached in this section. Plant layout, job design and work methods for increased productivity, and machine studies are but a few of the areas where in-depth studies are needed.

There are two methods of accomplishing this. The first is to hire consultants for each individual problem area. Consultant's fees can be a considerable amount over the long term and may not be justified for some of the problems. Also, many solutions that are presented are only "duty" solutions which the consultant adopts to fit the problem, thus the company may not be getting a valid solution specifically tailored to fit its individual needs.

An industrial engineer, as an assistant to the Plant Manager, can cover all operations in the production and manufacturing areas and, in doing so, could save the company money and justify his salary many time over. Some of the areas that are in the industrial engineer's realm are:

- Production and Design of existing and New Products
- Plant Relocation (see Appendix III-1).
- Plant Layout
- Design of Jobs and Work Methods
- Production Standards and Work Measurement
- Forecasting and Production - Inventory Systems
- Maintenance Policies
- Quality Control

How well can the engineer justify his salary? As an example, if he worked for the company in 1971 and had been able to cut costs of labor and

materials by only one percent, ignoring possible savings in overhead due to cuts in overtime, he would have saved the company $20,468.71. Another factor that has not been included is the possible decrease in manufacturing variances caused by more efficient and productive methods. After deducting his yearly salary, the company would have increased his gross profit by almost two percent. This savings would not be a one time occurence for, as long as the improved methods were in use, the engineer's past work would be paying off.

In a growing company, the engineer would have more potential for saving the company money as he would help minimize the costs of new forms of production as they are undertaken. A one percent savings, as used in the example, is a conservative estimate and is used only as an example to show the possible impact of such a move.

The engineer can start a chain reaction in the company as a whole. If he is able to save the company money by more efficient and productive methods in manufacturing, then the products are made for less and can possibly be sold for less. The company then can become more competitive and perhaps increase their market share. This increase in sales can bring in a greater volume of earnings, which can enable the company to grow and expand into areas of new products and new markets. Although this may seem optimistic, it is not totally unrealistic.

Recommendation III-15. An industrial engineer should be hired as a staff assistant to the plant manager.

APPENDIX III-1 PLANT LOCATION

There are two types of factors to be considered in plant location or relocation. The quantitative factors are easily calculated, because they can all be expressed in dollar terms and by incremental analysis. The difficult items to evaluate when considering a move are the qualitative factors. These are often intangibles and cannot be directly related to each other or to the quantitative factors. However, all the factors must be weighed to provide accurate information for an intelligent decision. Some of the many areas of consideration are:

Community - general information about attitudes, services, type of community, etc.

Construction Costs

Electricity - availability and rates

Gas - availability and rates

Housing - availability

Industries in Area

Labor Situation - availability and skills, bonus and fringe benefit practices, union contracts, wage levels

Markets - location of markets, growth potential of markets, transportation costs, etc.

Site - availability, options, price, title, zoning

Taxes - local and state

Transportation - freight rates, schedules, services

Water Supply - availability and rates

PART IV

MARKETING AND SALES

A. Summary

Fiber Glass Industries now sells through a combination of commission salesmen (17%), direct home office sales (9%), and through distributors (74%). Advertising is minimal and consists of advertisements in trade journals. Catalog inserts and folders now in use have confusing layouts. A campaign of personal letters with 8 x 10 photos of interesting applications of FGI products is sent to distributors at present.

Our proposed strategy is to reach by direct mail the people in industry who will order, specify, or fabricate with FGI products and make it very easy for them to order FGI products. This campaign will augment any sales material prepared by the distributors themselves.

B. Analysis and Recommendations

Problem. Non-agressive advertising and promotion campaigns.

Analysis. No matter what the product mix or outcome of production efficiency projects are, FGI must sell what it makes and insure a backlog of orders. This can only be accomplished through selling.

We assume (1) FGI's ability to increase production to accomodate increased sales and (2) little money is available for promotion.

How do we accomplish this?

Direct mail offers the best means of reaching present and potential customers. With it, you can reach the buyer, specifier, and, hopefully, the actual fabricator who might have a hand in product choice. In addition, it fills in the gaps between visits of distributor's salesmen and maintains contact with the smaller accounts that would be uneconomical to personally visit often. Since distributors guard their customer lists jealously, FGI will form their own. Your theme should be: "If there is business to be had, FGI will get it, if the distributor doesn't."

Direct mail will take the form of newsletters full of sales talk from FGI direct to recipient and hopefully lots of side information on markets, new uses of products, and possible areas that the customer should look into for more profits. It won't quite be a trade journal but similar. You have to give the customer something for his reading time, otherwise your mailing will be discarded.

Figure IV-1 and IV-1b shows a proposed sample of the newsletter. Note that this offers an excellent opportunity to advertise the inventory in storage at a reduced price and turn that inventory into money.

FGI misses a chance at selling in many areas. Here are two - - We propose modifying the company letter heads to a form similar to Figure IV-2. Why not get in a selling message along the edge--Displaying the product and telling what it can do for the customer to make him money. The leased trucking can be made to work also. Clamp on panels using the FGI logo and the words Fiber Glass Industries along with a listing of products give more exposure. You never know who is riding behind the truck; why not give him an FGI message to read (even better if it ties in with the current newsletter for the month)? This same idea can be applied to shipping cartons, crates and plastic covers. Even the advertising message imprinted can be changed to match the newsletter.

Figure IV-3 shows some sample small ads to position about the trade journals repeating the theme of the monthly newsletter. FGI doesn't need full page ads to sell its product. These small ads will catch the eye and communicate a single sales message to a select customer inexpensively.

At the same time, ghost written articles under FGI personnel signatures will start appearing in the trade journals addressing important industry subjects and how FGI solves the problem. Hopefully this gives the impression

PROGRESS IN FIBER GLASS fgi

FIBER GLASS INDUSTRIES, INC.

AMSTERDAM
NEW YORK

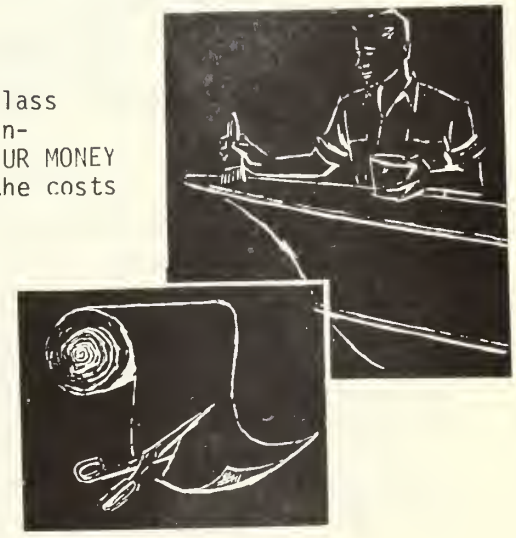
LT Donald H. Van Liew
US Coast Guard Base Boston
Boston, Mass.

CUT YOUR HAND LAY-UP TIME IN HALF WITH FABMAT-C

Fiber Glass Industries combines woven-roven and chopped glass with our chemical bonding to give you a non-ravelling, non-fraying, high-strength, uniform tension mat that SAVES YOUR MONEY in pattern cutting, matching, and wet out compared with the costs incurred if you had to alternate the layers yourself.

You can use Fabmat-C in yachts, boats, silos, swimming pools, tanks, pipes, vehicle components, appliance housings and equipment parts.

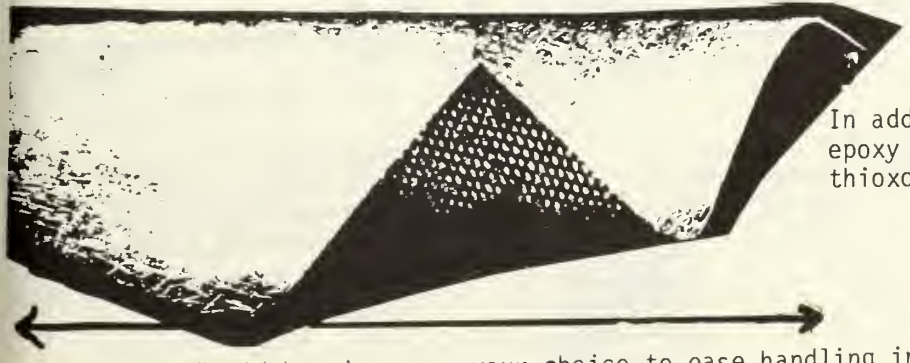
When you want a mat that's easy to work with and is STRONG IN ALL DIRECTIONS, order
Fabmat-C from Fiber Glass Industries
Amsterdam, N.Y.



EASY TO WORK WITH
STRONG IN ALL DIRECTIONS

4 WEIGHTS AND 78WIDTHS (4" to 158") GIVES YOU
FLEXIBILITY TO CUT COSTS RIGHT IN YOUR SHOP!!

You can choose Fabmat-C weights in 1 or 1 1/2 oz/sq ft mat of chopped fiberous glass strand chemically bonded to 16 or 24 oz/sq yd Rovcloth woven roving.



In addition Fabmat-C blends well with epoxy or with general purpose polyester thioxotropic resins.
GIVES YOU FLEXIBILITY

over please

4" thru 158" widths gives you your choice to ease handling in your shop.

Figure IV-1a Sample Newsletter

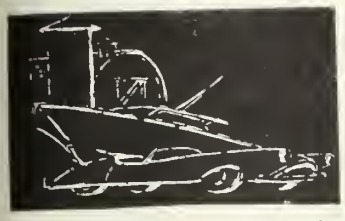
FIBER GLASS INDUSTRIES INNOVATES TO SAVE YOUR MONEY

Special Fabmat-C equipment generously sprinkles a controlled blend of chopped glass fibers on to our own woven roving.

This gives you a mat that's uniform--no thin spots to overlay.

We're big enough to fill your order for any quantity but flexible enough to meet your demands in width, quantity, delivery dates. Try us, you'll be pleased with PERSONAL SERVICE.

FABMAT 200#.38lb.



Here are some special values from our inventory of assorted sizes. We cut our inventory and overhead and you save monty NOW with pre-made widths and weights.

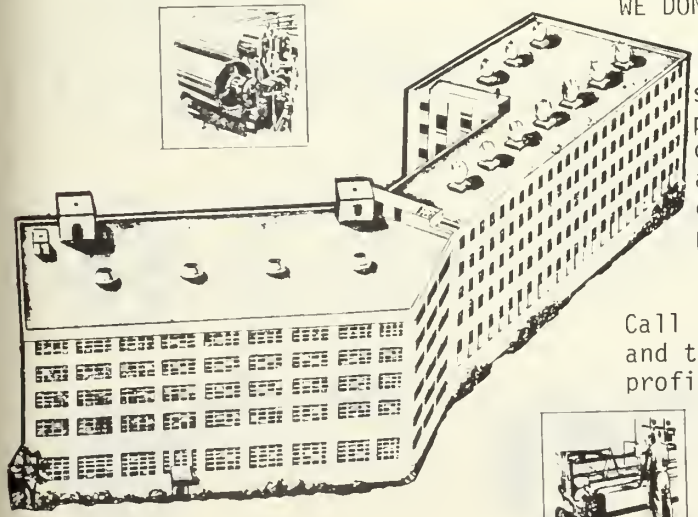
MEET CHARLIE PEDERSEN--HE CAN SAVE YOUR MONEY WITH FIBER GLASS INDUSTRIES PRODUCTS

Pic. of CHARLIE PEDERSEN ON PHONE ETC.

Charlie Pedersen is FGI's Vice President for Sales. He can answer your questions on how to better your finished product, scheduling of delivery dates, optimum width and weight, and price. If you stump him with a question, he'll get you the answer because we want you to maximize your profits.

Pic. of XYZ STORAGE CO. USING FGI PRODUCTS

Here's an interesting application using wide Fabmat-C. We saw it at the XYZ Storage Co. in Miami Florida. Construction time was more than cut in half since alternating of chopped glass and fabric was done by us FOR YOU in our plant, and bonded with our resin. IT SAVES YOUR TIME.



WE DON"T HAVE A PRETTY FACTORY TO BRAG ABOUT BUT...

it's filled with the best design and production specialists to give you Fiber Glass Industries products that you can turn into profits for your company. Fast efficient custom designed equipment and skilled operators insure your order's uniformity, delivery, size tolerance to ease your production problems.

Call Charlie Pedersen today at 518-842-4000 and talk about some beautiful products and profits for YOU!

Figure IV-1b Sample Newsletter

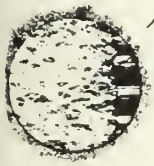
PROGRESS IN FIBER GLASS

FIBER GLASS INDUSTRIES, INC.

Amsterdam, N.Y. 12010
518-842-4000

formatt

Mechanically banded chopped-strand, fiber glass mat. Drapeable and formable. Standard widths up to 100" and weights of 1½ to 10 azs./sq. ft. Custom-made in widths up to 162" and weights to 32 azs.



rovmat

High tensile strength unidirectional mechanically banded chopped-strand, fiber glass mat with continuous parallel strands of roving, uniformly spaced. Widths up to 100" and weights of 2 to 10 azs./sq. ft.

fabmat

High tensile strength mat with base layer of fiber glass cloth or Ravcloth* to which a controlled deposit of chopped fiber glass strands is mechanically or chemically attached. Widths up to 158" and weights of 1½ to 10 azs./sq. ft.

textilmat

Parallel strands of fiber glass spun roving, mechanically interlaced to form a mat. Standard widths 40" and weights of 2 azs./sq. ft. Custom-made in widths up to 162".

kemat

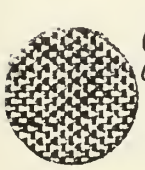
Resin-bonded chopped fiber glass strand mat. Widths up to 76" and weights ¾ to 3 azs./sq. ft.

filomat

High temperature thermal and acoustical insulating blanket of mechanically banded fibraus glass. Widths from 6" to 100" and weights of 1 to 16 azs./sq. ft.

rovcloth

Balanced or unidirectional fabrics made of fiber glass rovings in either continuous or spun strands. Weights from 9.8 to 36 azs. sq. yd. and in widths from 6" to 150".



glass cloth

All standard constructions and widths. Special widths up to 144".

Dear

We at FGI want to help you make MORE and EASIER SALES of Fiber Glass Industries Inc. products from now on!

So we've instituted a campaign of direct mail newsletters to everyone we can think of who might buy, specify or actually use one or more of our products. Some of them are in some strange industries, believe me, but we will make them customers of yours and FGI.

Here's how it will work.

We will process an order than comes in direct to us (and keep that first commission ourselves). Then we will send out to you, our distributor, the name of the customer in your area and from then on he's yours at the regular commission rate everytime he signs your order! You will get a pre-sold customer who only needs some interest shown in him by you. Work with him and you'll maintain steady orders from him through you to us. He stays on our mailing list so we can continue to show him how he can make more profits with FGI products.

You are also on our mailing list and will receive copies of ALL promotional material that FGI sends out.

This looks like a good way to boost sales of FGI products AND INCREASE YOUR COMMISSIONS in 72. - and that's what we both want !!

My best regards,

Charlie Pedersen

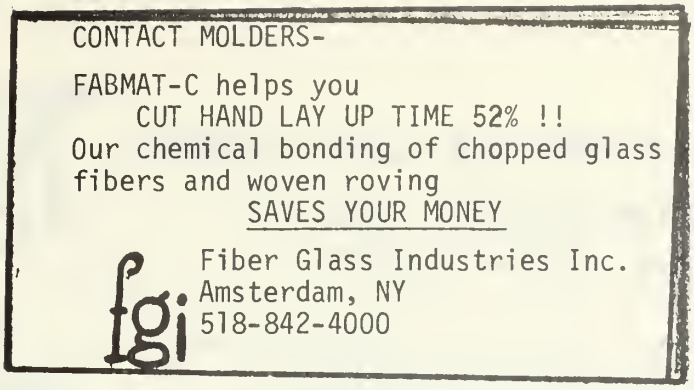
P.S. If any of your present or future customers are using FGI products in new or unusual ways (or just very successfully) call me collect so I can learn about it and perhaps feature them in one of our newsletters! Thanks.

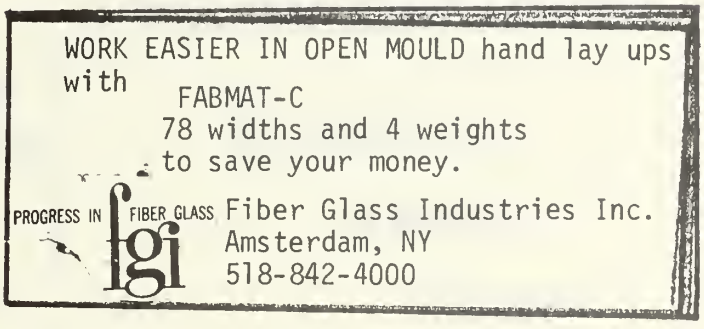
glass tape

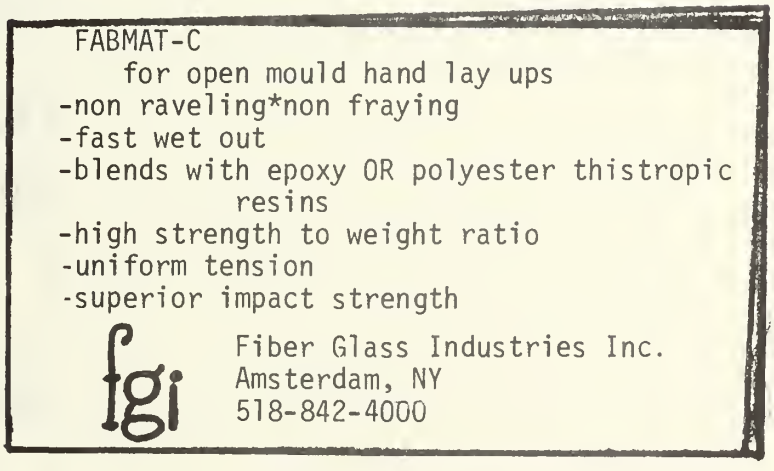
Wide range of standard weights and widths.

liquil

Figure IV-2 Sample Letterhead







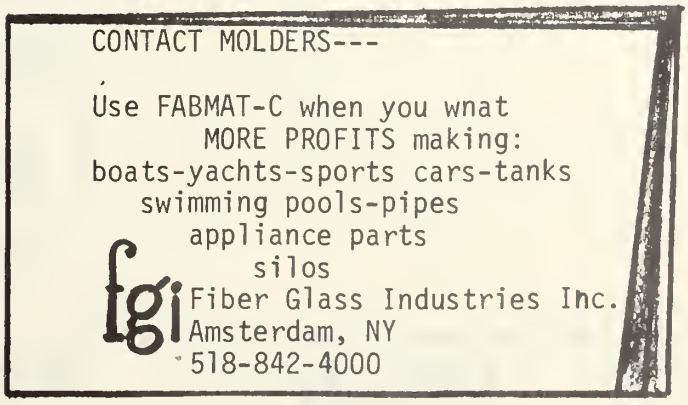


Figure IV-3 Sample Advertisements

PROGRESS IN FIBER GLASS

fgi

FIBER GLASS INDUSTRIES, INC.

SALES ORDER FORM

MINI- CATALOG

format

Airmail this form to us or use it as a guide and ORDER BY PHONE
by calling us collect at 518-842-4000.
WE'LL CONFIRM YOUR PRICE IMMEDIATELY

orders subject to terms and conditions on reverse

roomat

fabmat

textilmat

kemat

filmat

roovcloth

glass cloth

glass tape

bias il

REGULAR
ORDER
FORM

Figure IV-4 Sample Order Form

of innovation until a new line of products are actually produced. In addition, talks by FGI executives before selected audiences of possible customers, government leaders, etc. should be made.

One reason for this expanded exposure is to get many people familiar with FGI in case competition from the big vertically integrating fiberglass producers begins to hurt. At this point FGI yells "UNFAIR" and starts quoting anti-trust laws to everybody who will listen, perhaps getting government help or just gaining the protection of the giants so they can point to FGI and say that the small producer is still successful in the fiberglass business.

See Figure IV-4 for another example of making it easy on your customers to spend money with FGI. Order forms could be modified in a manner similar to the new proposed letterhead to actually show the product that is being ordered.

A possible explanation of the proposed new sales system to the distributors is included in Figure IV-2 in personal letter form.

Once having expanded the market for FGI products additional sales can be obtained by acting as distributors for other manufacturers' products. Even though smaller than Owens-Corning and other giants, FGI can still offer a complete line of products. Once the customer is in your shop, keep him in and buying everything from FGI.

Recommendation IV-1. Publish a monthly newsletter (can be more often).

Recommendation IV-2. Redesign of letterheads, envelopes, order blanks with selling message.

Recommendation IV-3. Utilize truck cab and trailer, packing cartons, crates, and plastic wrapping for advertising message.

Recommendation IV-4. Use only small ads in trade journals to support newsletter.

Recommendation IV-5. Create a stream of articles for technical trade magazines.

Recommendation IV-6. Act as distributor for other manufacturers so a complete line can be sold under FGI label.

PART V

ACCOUNTING AND FINANCE

A. Summary

FGI has been restricted to varying degrees over the last 15 years by the inflexibility of its own financial position. The small amount of equity in the original capital structure and the rapid growth of the business have caused management to constantly battle for liquidity. This situation has greatly influenced the terms of many, still existing, relationships with creditors, suppliers, and customers.

The financial management of FGI, which consists of the President and the Vice President and Treasurer, has utilized both long and short term loans and a bond issue to meet the needs of the operation. There are currently two major long term agreements. The oldest of these is a restrictive loan which was secured in 1967 from New York Business Development Corporation (NYBD) and will be terminated in 1973. The other indenture for $150,000 is to Pittsburgh Plate Glass (PPG), through the Homestead Place Corporation, which requires Principal repayment beginning in 1974. Additionally, there are $80,000 of 20 year, 7% notes in the capital structure which can be retired following a one year notification. Management has also been successful in using short term loan financing of receivables. The present relationship of this type is with the New England Merchants Bank and Walter-Heller of Boston, Mass. The stringency of past agreements of this type has forced the extention of discount terms to customers to reduce the receivables collection period on high risk accounts. The use of such methods has not, until recently, permitted FGI to take advantage of the discounts given by their suppliers.

Management expects future funding to consist primarily of loans from commercial banks. These funds would not be used for long term expenditures. This base and the uncertainties in the system and the environment have caused the use of 1 to 3 year payback period to evaluate capital budgeting requests. This heuristic is applied to all situations, but is tempered by an

understanding of urgency, a desire for growth, and the limitations imposed by existing loan agreements.

The financial statements of FGI are prepared according to standard accounting principals. Reports show depreciation as straight line, but tax preparations use the most currently advantageous system. The inventory system was changed in fiscal 1971 from last-in-first-out (LIFO) to the more conventional first-in-first-out (FIFO) method. The change, which has an associated tax cost of $6,000 per year for the next 20 years, was made primarily to facilitate negotiations with creditors and suppliers. Reports do not include the international holdings of FGI.

At the urging of their accounting consultants, management recently changed from a standard cost control system to a marginal income system. The reports of the month of March, 1972 are the first to show the new system. No final evaluation has yet taken place.

Since some of the future analysis will be based on projected earnings and projected sales volume in dollars, the projections are now formulated. Figure V-1 shows the wide variations in before tax earnings for 1967 - 1971. Because no trend can be established from this particular data, expected earnings will be related to sales, if a trend can be established and a functional relationship can be formulated.

If sales for the years 1965 - 1971 are plotted on semi-log paper, a line of projection can be made. This is done in figure V-2. The graphical projection for the 1972 fiscal year is 5.5 M which agrees closely with management's 1972 budget of 5.7 M. If there is a bias, it is conservative. The resultant sales projections are tabulated in table V-1 along with actual data for 1965 - 1971.

Table V-1 SALES PROJECTIONS

Fiscal Year	Sales	Fiscal Year	Sales ($)
1965	2.2M	1971	4.7M
1966	2.8M	1972	5.5M
1967	2.6M	1973	6.4M
1968	3.4M	1974	7.3M
1969	4.5M	1975	8.4M
1970	3.5M	1976	9.5M

These projected sales figures imply an annual growth rate of 15%.

The relationships between earnings before interest and taxes and sales volume is shown in table V-2.

Table V-2 EARNING TO SALES RELATIONSHIP

Fiscal Year	EBIT/Sales
1965	.012
1966	.032
1967	.001
1968	.057
1969	.015
1970	.023
1971	.021
	Σ = .161

(If the 1972 figure is included (.031) as per management mgt. projections, then $\overline{X}$ = .024).

This data implies that current operations can expect to return between 2% and 3% on sales. No tight statistical analysis was performed since it would have

little real-life significance. $\bar{X}$ = .024 will be used for future projections since it includes the projection of 1972. However, for uniformity and to eliminate an overstatement of expected earnings and retentions, the 1972 earnings will be projected on the standard basis instead of the current basis of .031 times projected sales. Applying this rate yields the expected earnings shown in table V-3. Since the actual interest costs charged against earnings will depend upon successful management of working capital and possible additions of debt in the capital structure, interest costs are assumed to be constant at $80,000 annually. If this figure changes as decisions are made or plans are realized it will be easier to adjust from a constant base. The assumption is also made that the average corporate tax rate is 50%.

Table V-3 EARNINGS PROJECTIONS

Fiscal Year	Projected Sales $	Earning before I & T	Interest	Earnings After I	Earnings After I & T
1972	5.5M	137K	80K	57K	29K
1973	6.4M	154K	80K	74K	37K
1974	7.3M	176K	80K	96K	48K
1975	8.4M	202K	80K	122K	61K
1976	9.5M	228K	80K	148K	74K

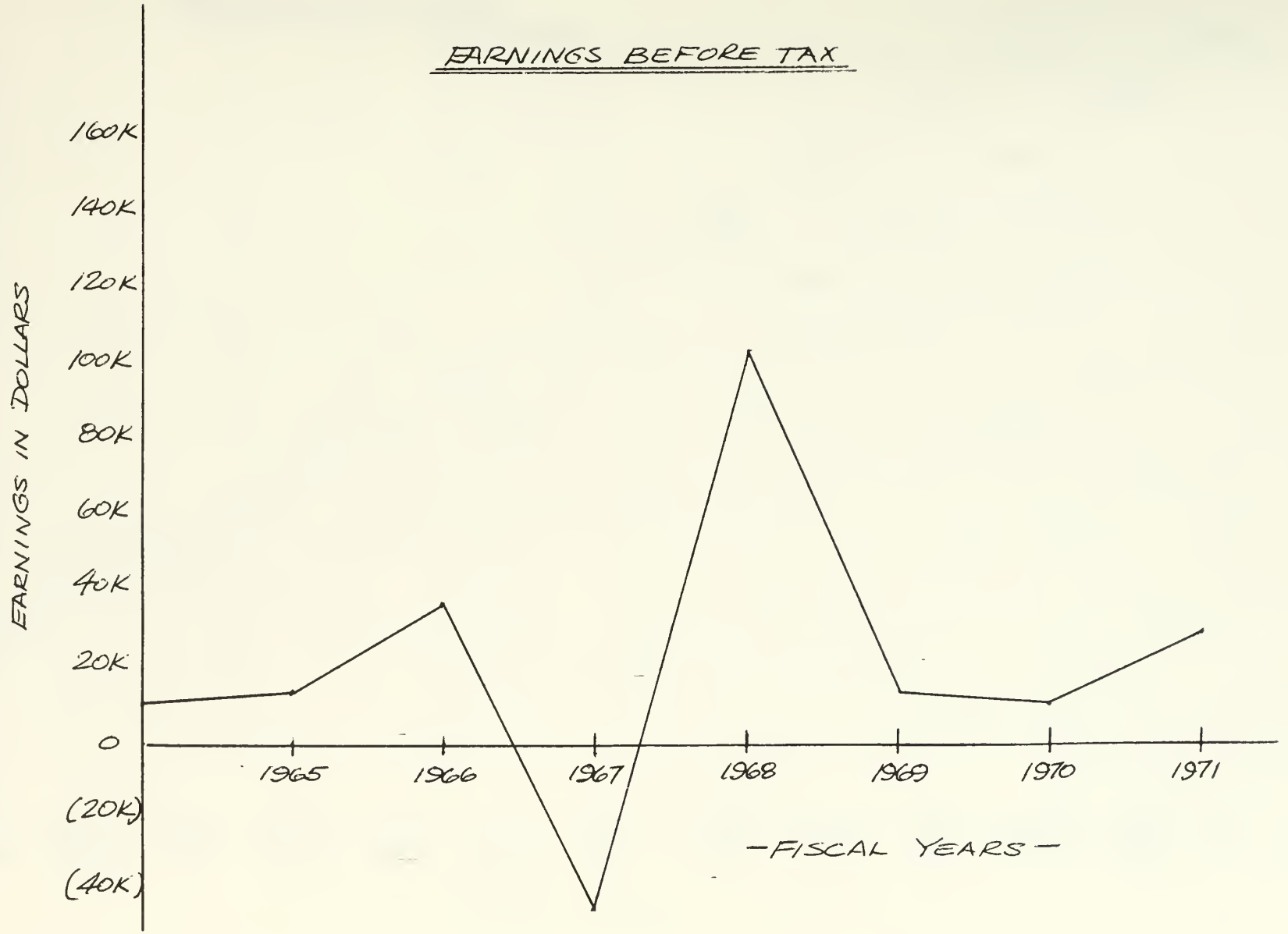

EARNINGS BEFORE TAX
EARNINGS IN DOLLARS
160K
140K
120K
100K
80K
60K
40K
20K
0
(20K)
(40K)
1965
1966
1967
1968
1969
1970
1971
—FISCAL YEARS—

Figure V-1

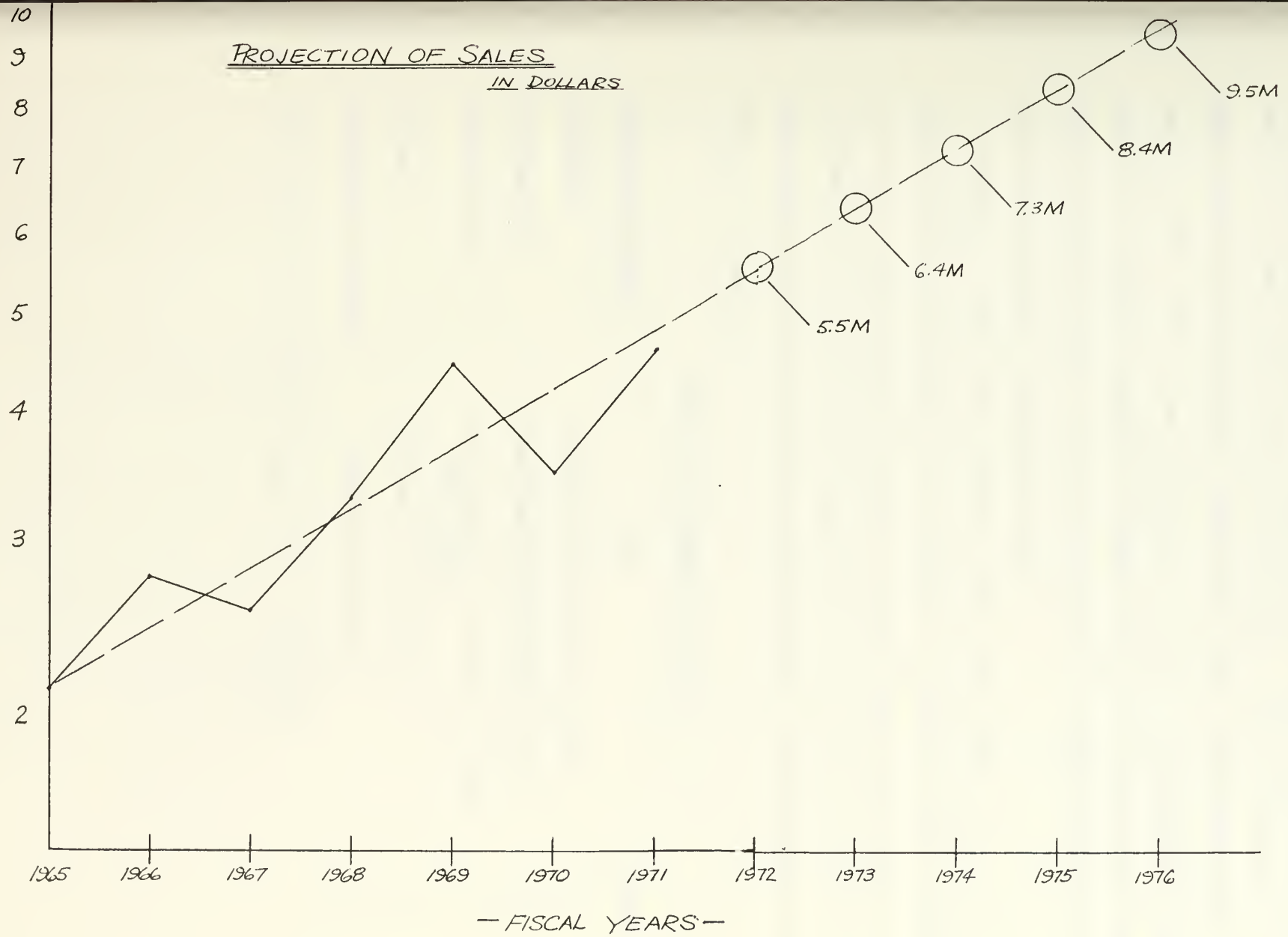

PROJECTION OF SALES
IN DOLLARS
10
9
8
7
6
5
4
3
2
9.5M
8.4M
7.3M
6.4M
5.5M
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
— FISCAL YEARS —

Figure V-2

B. Analysis and Recommendations

Problem. In any enterprise there is a need for simple quantitative monitoring of each area of the operating system. This intense use of a broad spectrum of statistically significant ratios for analysis may be lacking at FGI. This is not necessarily a problem if management's understanding is extensive enough to eliminate this need. Analysis and recommendations should be viewed in this light and with an understanding of the increasing needs of an expanding business.

Analysis. There are a great many ratios which can be used to determine the strengths and weaknesses of an operation. We feel a logical approach is to use a single measure for general review of each of the areas that contribute to the health of the organization. For this reason the following five ratios are initially used to analyze available data from 1965 to 1971 financial statements.

Table V-4 SUMMARY OF RATIOS

Functional Measure	Ratio	Variable
Liquidity	Working Capital/Total Assets	X1
Profitability	Retained Earnings/Total Assets	X2
Productivity	Earning before interest and tax/ Total Asset	X3
Solvency	Net Worth/Total Debt	X4
Competitive Abilities	Sales/Total Assets	X5

These five ratios have the values given in table V-5.

Table V-5 HISTORICAL VALUES OF RATIOS

Fiscal Yr.	Working Capital / Total Assets	Retained Earning / Total Assets	EBIT / Total Assets	Net Worth / Total Debt	Sales / Total Assets
1965	.063	.105	.036	.292	2.66
1966	.011	.093	.073	.339	2.30
1967	.087	.094	(.027)	.222	2.60
1968	.068	.132	.137	.496	2.44
1969	.025	.144	.040	.328	2.66
1970	.025	.163	.059	.414	2.58
1971	.134	.127	.054	.338	2.49

Professor E. I. Altman of New York University has proven statistically that these particular ratios can be combined, for companies of FGI's size, to form an overall discriminating index (Z). Though there is no absolute index value that is significant beyond doubt, it is interesting to determine the trend of the combination of variables. The combining equation and resultant values are given in table V-4.

Table V-6 DISCRIMINATING INDEX

$Z = 1.2(x1) + 1.4(x2) + 3.3(x3) + .6(x4) + 1.0(x5)$

Fiscal Year	Index (Z)
1965	3.00
1966	2.79
1967	2.88
1968	3.46
1969	3.22
1970	3.28
1971	3.21

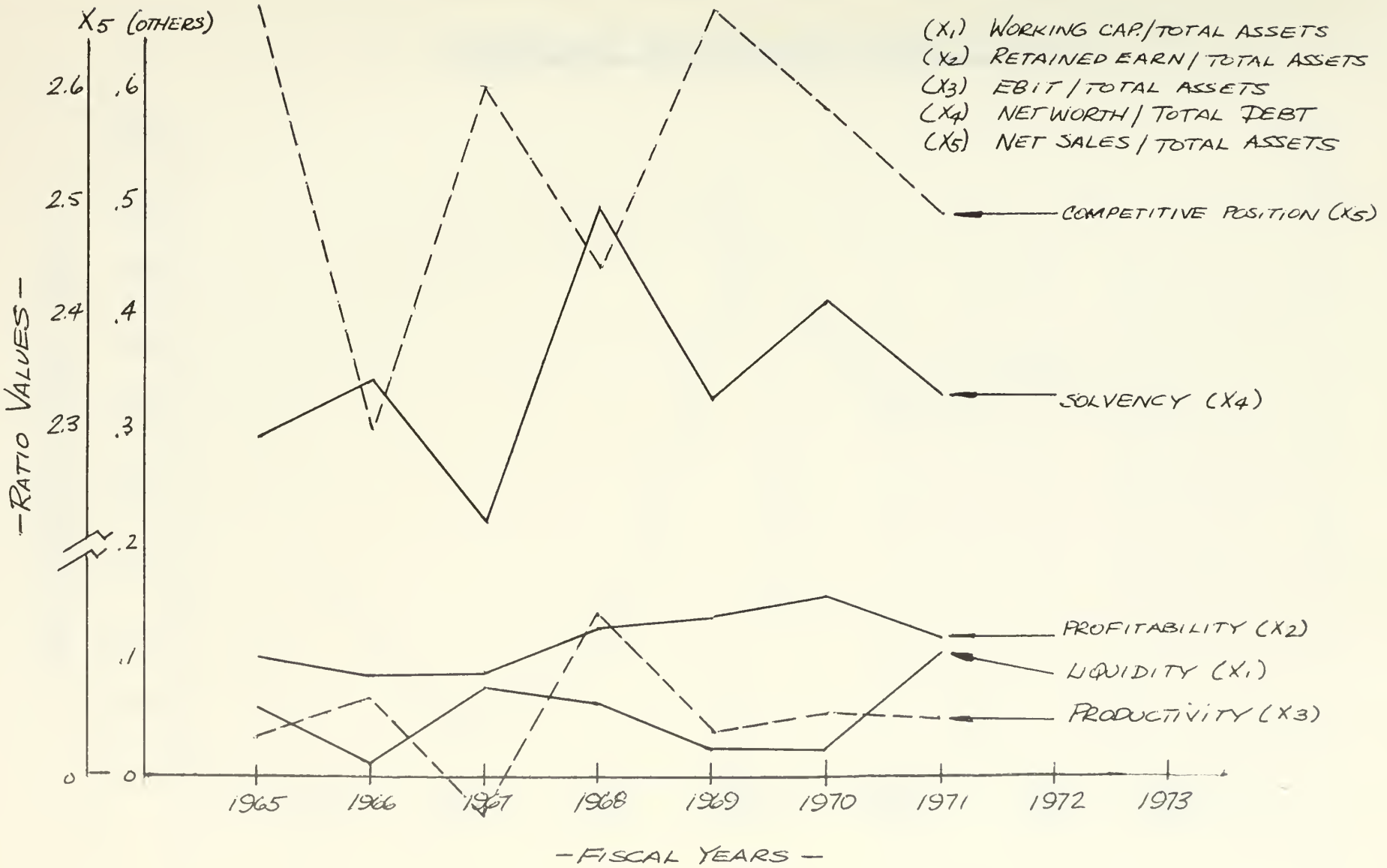
The trends of the indicator (Z) and the individual measuring can best be seen by referring to figure V-3 and V-4. It can be seen from figure V-3 that there are wide fluctuations in the measures of competitive ability, overall solvency and productivity. The particular movements show some expected, but significant, correlations with the measure of liquidity. Specifically, the company solvency has a high positive correlation with the liquid position while the competitive ratio has a high negative correlation with both solvency and liquidity.

The profitability has been quite stable while the productivity of the enterprise has not rebounded significantly from 1967 and 1969. The negative correlation to sales volume could be expected, for rapid increases in production inherently have the potential to breed inefficiency.

It should be noted that there is a decline in the competitive measure in a year of increasing sales, 1971. This drop from 1970 may indicate a decreasing success in the employment of assets to generate sales. However, this can not be stated unequivocably.

The graph in figure V-4 of the overall index shows some stability in the years 1969 - 1970 - 1971, and a definite increasing trend from 1965 - 1971 with an intermediate reaction in 1968 due to admirable earnings. The youth and growth of the company precludes any conclusions beyond these suggestions:

Recommendation V-1. Since the use of these ratios shows the negative correlations in the system between the critical areas of overall solvency and liquidity and sales position and volume, emphasis should continue to be placed on such reviews when plans are finalized. The reactions in the system may be best noted by use of these ratios in addition to those currently in use by management.



(ALL DATA BASED ON (LIFO) INVENTORY SYSTEM)

Figure V-3

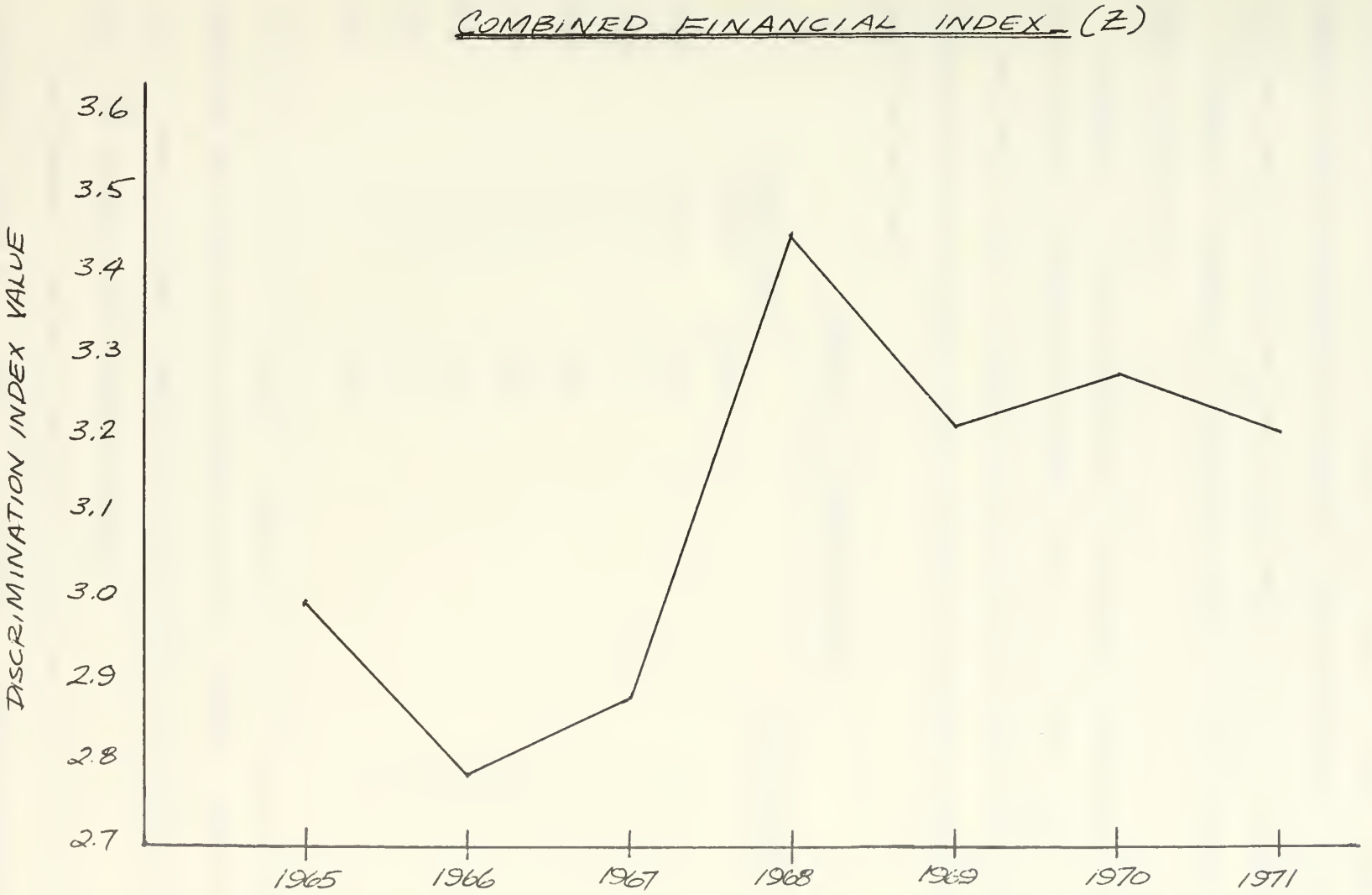

COMBINED FINANCIAL INDEX (Z)
DISCRIMINATION INDEX VALUE
3.6
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7
1965
1966
1967
1968
1969
1970
1971

Figure V-4

Recommendation V-2. Since the competitive application of resources is decreasing while sales are increasing, a review of capital appropriation methods should be undertaken. Possibly, simple monitoring of this particular area may show that this reaction is explainable and self correcting.

Problem. Management of the current assets and liabilities has long been a problem area.

Analysis. A closer evaluation of the existing trends and relationships can be begun by reviewing the "current ratio" and "quick ratios" in table V-7 for 1965 to 1971. It should be noted that the 1965 to 1970 data was not adjusted for the tax impact of the variation in inventory system. This effect should not be great.

Table V-7 LIQUIDITY RATIOS

	Current Ratio		Quick Ratio
	(LIFO)	(FIFO)	
1965	1.09	1.38	.65
1966	1.03	1.19	.57
1967	1.11	1.35	.77
1968	1.10	1.28	.66
1969	1.03	1.19	.49
1970	1.04	1.24	.60
1971	1.21	1.28	.68

This data is plotted in figure V-5. There are no significant or shocking variations that have not been pointed out by the (working capital/total assets) ratio. There is a general upward trend since 1969, but optimism based on such a low relative point would be unsound.

The changes in the major components of current assets and liabilities are shown in figure V-6. These are receivables, inventory, payables to

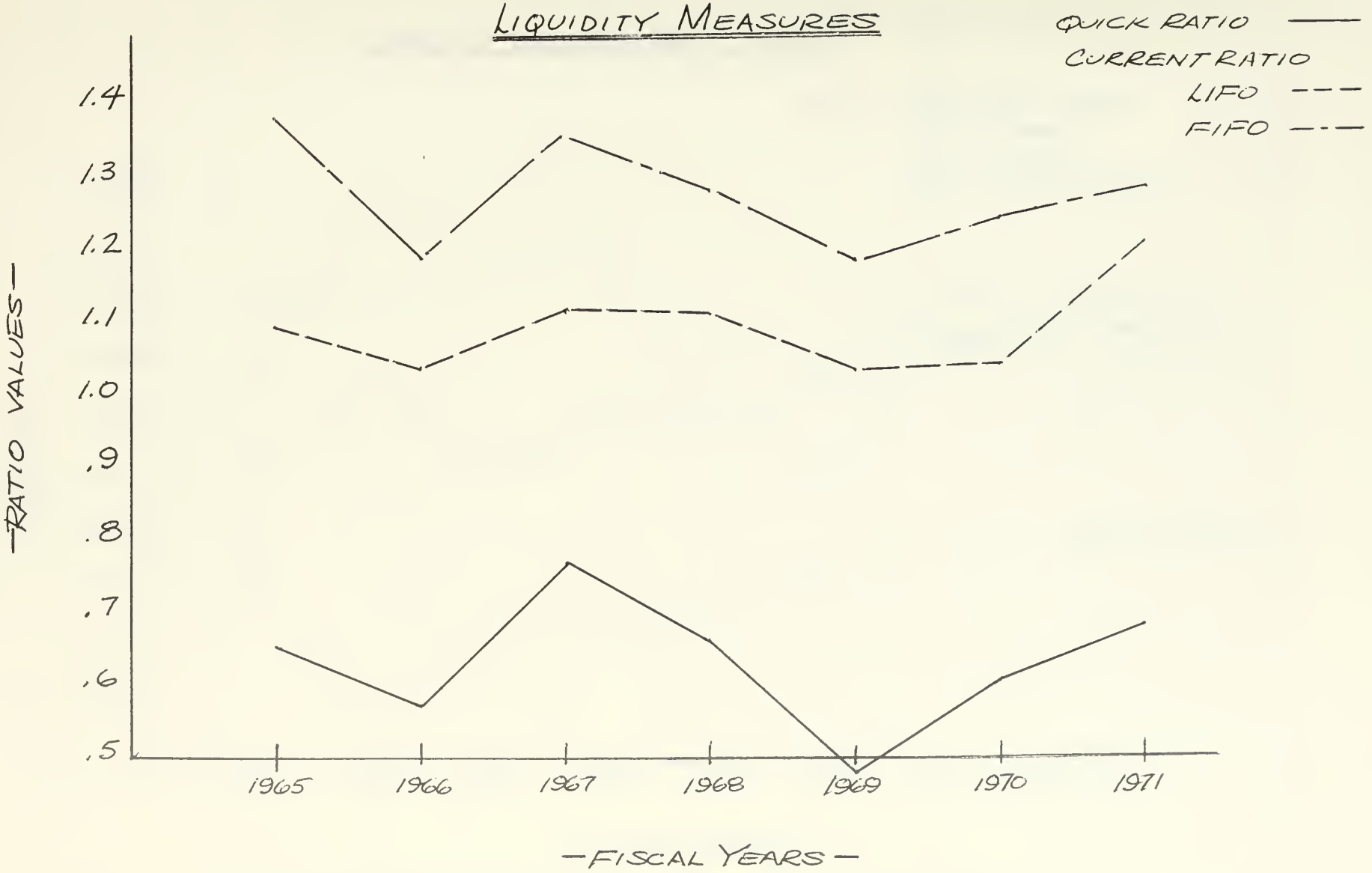

LIQUIDITY MEASURES
QUICK RATIO
CURRENT RATIO
LIFO
FIFO
RATIO VALUES
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
1965
1966
1967
1968
1969
1970
1971
FISCAL YEARS

Figure V-5

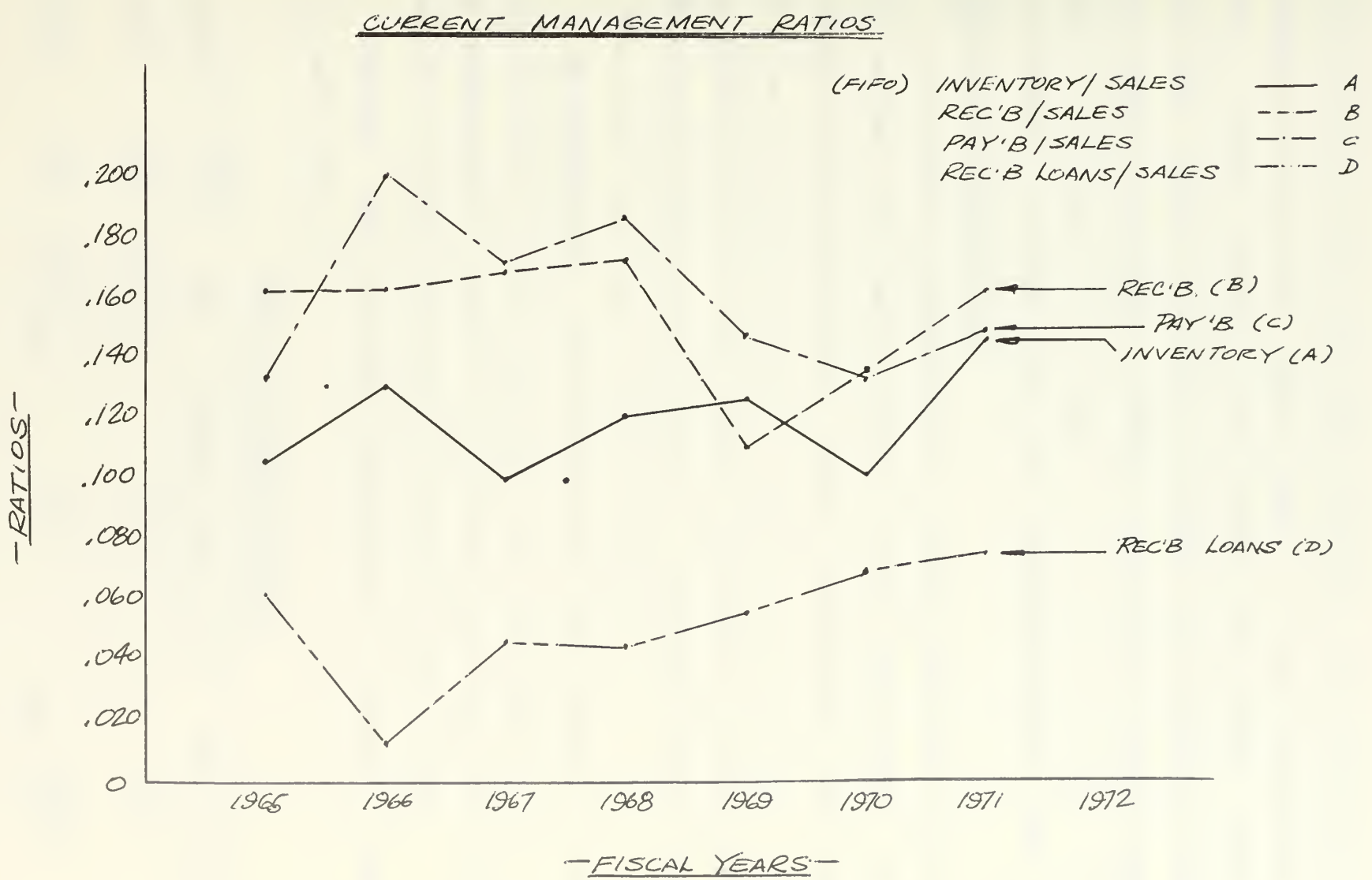

CURRENT MANAGEMENT RATIOS
(FIFO) INVENTORY/ SALES — A
REC'B/SALES --- B
PAY'B/SALES —·— C
REC'B LOANS/SALES —··— D
.200
.180
.160
.140
.120
.100
.080
.060
.040
.020
0
-RATIOS-
REC'B. (B)
PAY'B (C)
INVENTORY (A)
REC'B LOANS (D)
1965
1966
1967
1968
1969
1970
1971
1972
-FISCAL YEARS-
(NOTE: MIRROR IMAGES OF "A" AND "B" AND "C" AND "D")

Figure V-6

suppliers and short term loans against receivables. The variables are plotted as ratios to sales. There is danger in the use of year-end data for such measures since they may not represent yearly averages. However, in a stable situation any increase in inventory would presumably be accompanied by a decrease in receivables. Similarly, any decrease in accounts payable should be associated with an increase in loans against receivables. These relationships, as related to sales, are as expected, except for 1971. All four ratios increased in 1971.

The increase in loans may be due to a change in the ratio of short to long term debt. This change in emphasis will be viewed separately. The increases in both current assets (inventory and receivables) would indicate an increase in collection period and increase inventory commitment. However, management does not see a major change in the length of collection periods which average 45 days on net 30 day terms. (This figure includes collections of two accounts under special discount arrangements.)

Recommendation V-3. Since the two shorter term arrangements constitute approximately 20% of yearly volume they distort the average collection figure. We recommend that all analysis of collections be made without these normal additions by adjusting both sales and receivables before dividing.

Analysis. These two discount relationships with customers are roughly outlined in table V-8.

Table V-8 CUSTOMER DISCOUNTS

Customer	Annual Volume	Terms	Effective Interest Rate	Annual Discount
Burton	$600K	(1½% in 10 days)	27%	$9K
Durken	$400K	(1% in 20 days)	36%	$4K
			TOTAL	$13K

These arrangements were established to alleviate past liquidity problems. Though the absolute maximum cost is not great, loans at 9% would reduce the costs by 2/3 and 3/4 respectfully, to an annual figure of $4000 or a net decrease of $9000. Certainly, there is marketing value in the extension of such terms, but the costs should be weighted against the lost revenue on such arrangements.

Recommendation V-4. We recommend that the marketing department bear the responsibility for the continuance of such discount terms. Any future plans should consider the possibility of complete elimination of discounts since the effective rates of interest are so high. Take steps to change both relationships to 1% in 10 days which would change the effective rate to 18%.

Compared to discounts given customers are the discounts provided to FGI by their suppliers, Owens Corning and Pittsburgh Plate Glass. These terms respectively permit FGI 24% and 18% effective rates. Thus the adjustment in customers terms to 1% in 10 day, net 30 days would eliminate the extension of terms that are more liberal than those offered to FGI.

Recommendation V-5. Since approximately 15% of accounts are collected after 60 days, the marketing impact of applying a 1% service charge to these accounts should be investigated. A reduction of 15% in the required loans would yield about $6000 annually or alternately the 12% revenue would exceed the 10% loan charges.

Analysis. The relationships between short and long term debt can be seen in table V-9 and figure V-7 for 1965 - 1971.

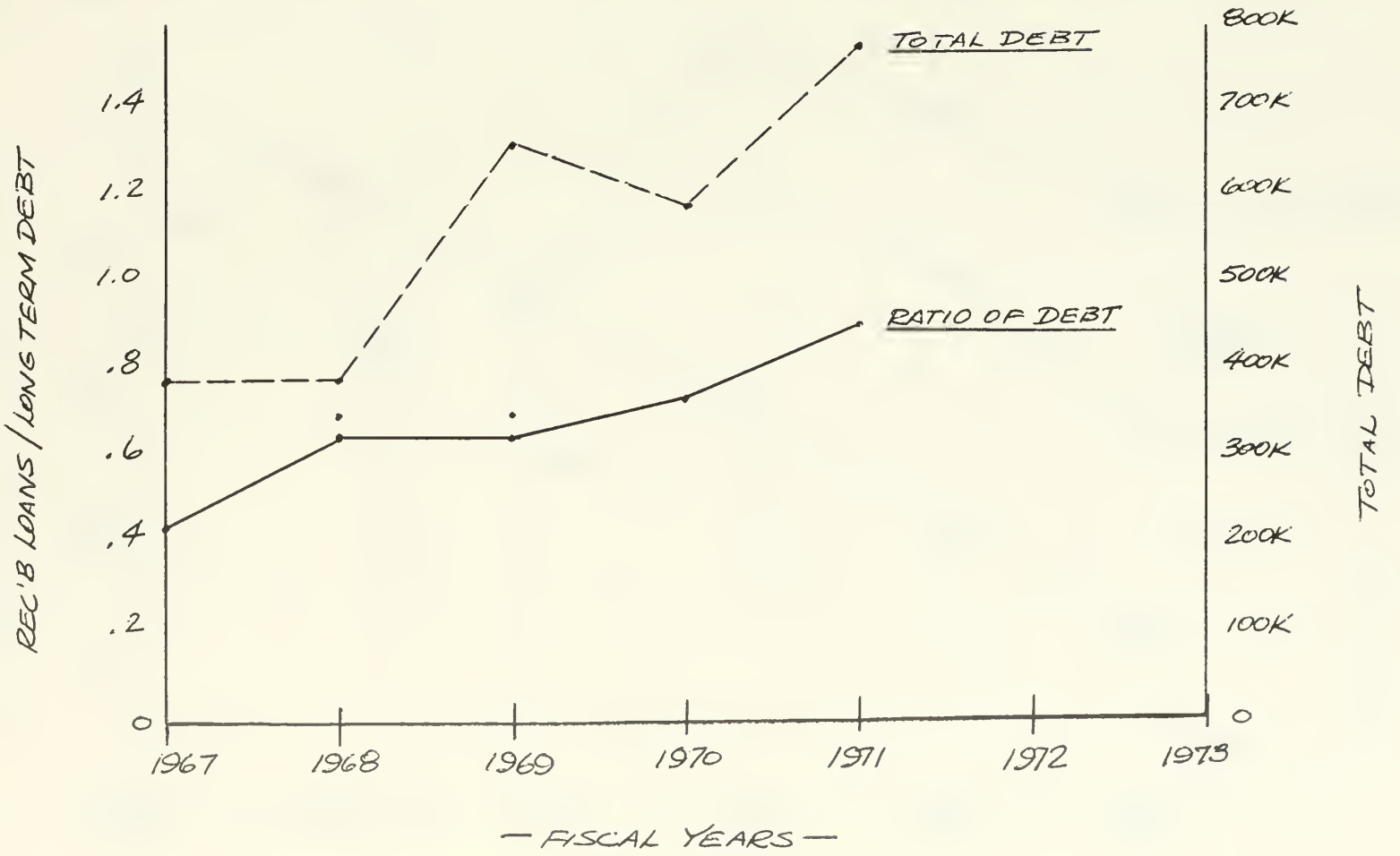

APROX. RELATIONSHIP OF SHORT TO LONG TERM DEBT*
TOTAL DEBT
RATIO OF DEBT
REC'B LOANS / LONG TERM DEBT
TOTAL DEBT
1.4
1.2
1.0
.8
.6
.4
.2
0
800K
700K
600K
500K
400K
300K
200K
100K
0
1967
1968
1969
1970
1971
1972
1973
— FISCAL YEARS —
*(SHORT TERM = ONLY REC'B LOANS)

Figure V-7

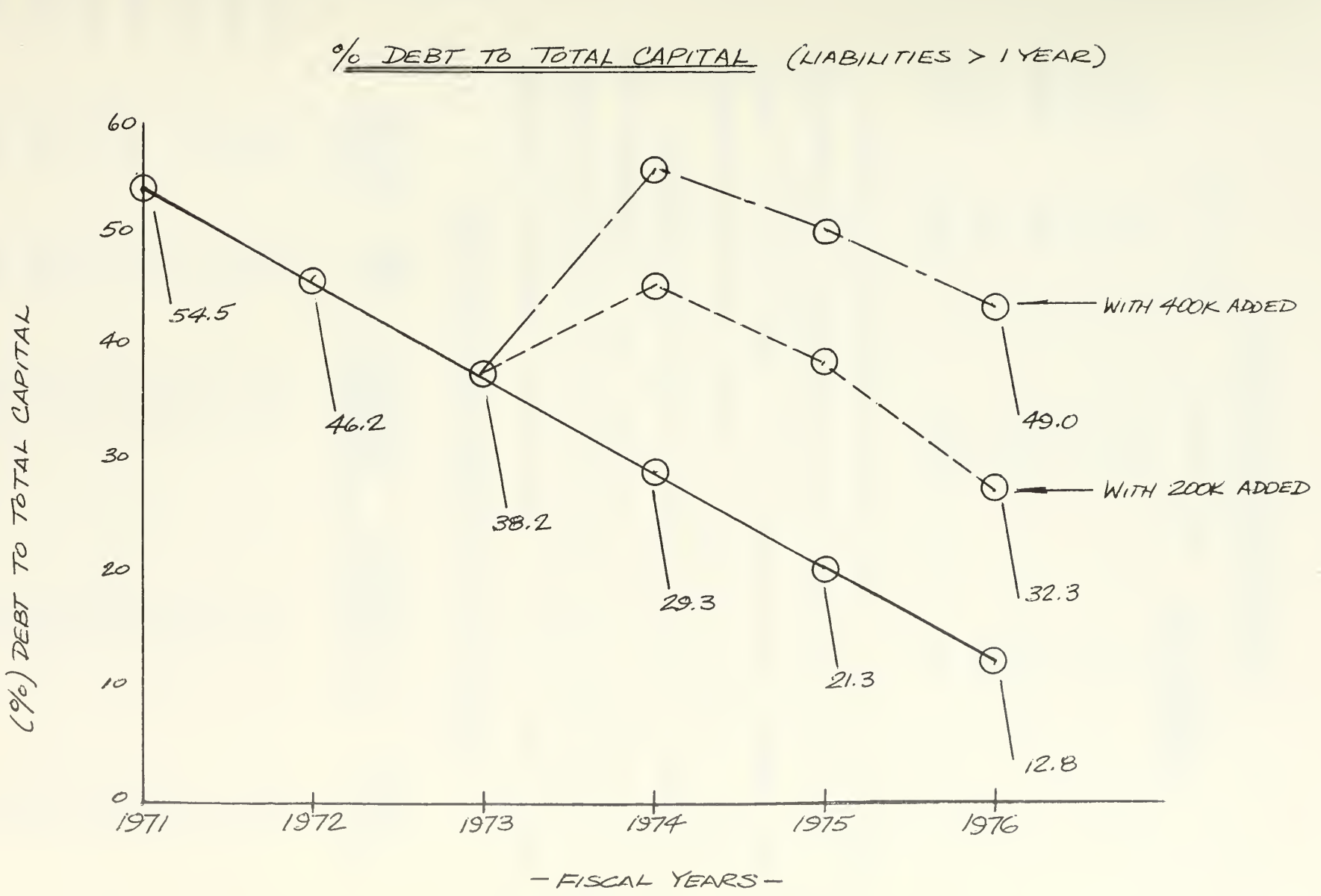

% DEBT TO TOTAL CAPITAL (LIABILITIES > 1 YEAR)
(%) DEBT TO TOTAL CAPITAL
60
50
40
30
20
10
0
54.5
46.2
38.2
29.3
21.3
12.8
WITH 400K ADDED
49.0
WITH 200K ADDED
32.3
1971
1972
1973
1974
1975
1976
— FISCAL YEARS —
(ALL DATA IS BASED ON THE RESULTS OF SALES PROJECTIONS AND CURRENT TREND)

Figure V-8

Table V-9 DEBT RELATIONSHIPS

	Rec'b. Loans	Long Term Debt	Rec'b Loans / Long Term Debt
1967	121	278	.44
1968	156	238	.65
1969	259	402	.65
1970	249	337	.74
1971	374	409	.91

The cost of the current receivables loans is 10% on the balance with the addition of a three day float which effectively increases the cost by 10% to 11% on the balance. This can be compared with expected costs of commercial bank loans or insuance of bonds which might be 7 to 8%.

The working capital needed to sustain operations is shown in Table V-10. The relationships to sales, though not as tight as a cash flow analysis, should serve to project the working capital needs of the future, if the assumption is made that no major changes will occur in the operation system.

Table V-10 ($000) WORKING CAPITAL RELATIONSHIPS

	Working* Capital (FIFO)	Rec'b Loans	Required un-incumbered Working Capital	Generated Working capital to Sales	Loans to Sales	Required Working Capital to Sales
1965	202	139	341	9.4%	6.3%	15.7%
1966	180	39	219	6.4%	1.4%	7.8%
1967	247	121	368	9.5%	4.7%	14.2%
1968	260	156	416	7.9%	4.6%	12.5%
1969	211	259	470	4.7%	5.7%	10.4%
1970	202	249	451	5.8%	7.0%	12.8%
1971	336	374	708	7.0%	7.7%	14.7%
			Average	7.3%		12.5%

*(data not tax adjusted 1965 - 70) (Average without 1966)

Although the assumed constancy of the system may not be in accordance with actual expectations, the application of these average figures should serve as a base for projections of needs. Estimations of the differences between the working capital supplied by operations and the needs of the system are shown in rable V-11.

Table V-11 WORKING CAPITAL PROJECTIONS

	Sales ($M)	Working Capital		Required Financing ($000)
		supplied ($000)	needed ($000)	
1972	5.5	420	750	330
1973	6.4	470	850	380
1974	7.3	530	970	440
1975	8.4	610	1110	500
1976	9.5	690	1260	570

The data in the last column can be reduced by the $150K increase in working capital supplied by the (120 day) terms of the two new foreign suppliers. The PPG loan of $150K will have a nearly constant impact since repayment begins in 1974, when the current portion of other loans will no longer appear in the liabilities. Thus management has started proceedings that will result in a decrease in deficit needs to approximately $200K in 1972 and to approximately $400K by 1976.

Recommendation V-6. It is recommended that the observed trend toward more current obligations be reversed in accordance with the two noted arrangements. A reduction of the $200K borrowing by 3%, with a loan, would yield $6000 annually and would have indirect benefits. This shift from shorter to longer term obligation would have a favorable effect on the overall solvency of the company throughout the business cycle.

Recommendation V-7. It is further suggested that the $400K needed for

operations be met by financing in 1975 or 1976 along with other refinancing discussed in the capital structure section.

Problem. The future capital structure is in doubt.

Analysis. The earnings values developed in table V-2 can be used to help analyze the future capital structure. In order to develop a feel for the past, capital situation, table V-12 summarizes the 1967 - 1971 long term (>1 year) debt and equity. It should be noted that the 1971 adjustment due to the change in inventory accounting methods was not adjusted for the yearly tax and carried back through 1967 since this data is only for background information.

Table V-12 ($000) CAPITAL STRUCTURE SUMMARY (1967 - 1971)

	1967	1968	1969	1970	1971
Debt (long Term) Mortgage Loan (NYBD)	201	170	322	250	178
7%, 20 Year Notes*	67	68	76	83	80
Nat'l Bank of Troy	---	5	4	4	1
Homestead Place	---	---	---	---	150
Total Debt	278	238	402	337	409
Equity					
Common Equity	19	19	21	21	21
Retained Earnings	71	184	197	222	242
Inventory Adjustment	---	---	---	---	79
Adjusted Ret. Earnings	---	---	---	---	321
Total Equity	90	203	218	243	342

(*Data includes accrued, unpaid interest)

Current debt relationships which continue from table V-12 and equity projections based on 100% retention of expected earnings, (as projected from sales), are shown in table V-13.

Table V-13 CAPITAL STRUCTURE PROJECTIONS (1972 - 1976)

	1972	1973	1974	1975	1976
Debt (Long Term)					
Mortgage Loan (NYBD)	106	36	---	---	---
7%, 20 year notes	80	80	75	75	75
Homestead Place	150	150	123	69	15
(Total Debt w/o additions)	336	266	198	144	90
Equity					
Common Equity	21	21	21	21	21
Expected Retained Earnings*	371	408	456	517	591
Total Equity w/o additions	392	429	477	538	612
Total Capital	728	695	675	682	702
% Debt to Total Capital	46.2	38.3	29.3	21.3	12.8

The percentage of debt in the capital structure, as presented in table V-13, is graphed in figure V-8. This figure also includes debt to total capital percentages if refinancing of debt in 1974 is $200K or $400K. Since capital additions are lumpy, it is difficult to establish an average ratio or percentage of debt to total capital. For comparative purposes it should be noted that Owens-Corning and Pittsburgh Plate Glass have 28.1% and 29.9% debt in their capital structure.

It should be noted that the receivables loans, and leases have a degree of permanence in the present system. They are discussed separately and are not theoretically a part of the structure.

Two things are apparent at this juncture. First, the capital structure that is anticipated shows no self expansion needed to support the anticipated activity and growth, second, the reduced debt in the system provides the flexibility needed to restructure the financing to best meet the needs of 1974 - 1976. The relaxation of restrictions imposed by NYBD should also provide an opportunity to align expenditures and financing by class and obligation.

Recommendation V-8. It is recommended that a massive plan for recapitalization be immediately outlined for the period (1972 - 1976) based on the expectations outlined here or on estimates in which management has confidence. This plan should seek an optimal debt to equity ratio and should provide capital for expenditures on income producing assets. The longevity of the issues will be critical and every effort should be made to arrange an environment that is favorable to either long term debt and/or equity.

This refinancing program should have two major types of considerations. First, the ordering of obligations will certainly have an impact on the cost of each portion and may restrict the issuance of each part. Obviously it is preferable to secure and employ $200K in loans by 1973 in accordance with other recommendations and to make every effort to secure longer term financing by 1976. The amounts needed should reflect the added working capital needs of $200K for 1973, the opportunities for investment, and the earnings contributions for the period.

Refinancing of the enterprise by 1976 is naturally contingent on continued improved earnings. The bottom line of the Profit and Loss Statement will have more than its rightful share of influence. For this reason accounting

adjustments and distribution of expenses should be planned into the 5 year (1972 - 1976) program. The results of such improved appearances could also open opportunities for merger or acquisition.

Recommendation V-9. It is suggested that policy be adjusted in accord with accepted procedures to improve the company statements. The LIFO to FIFO change was a major first step in this direction. The momentum should be increased by capitalizing R & D expenses, planning succeedingly decreasing expenditures (1972 - 1976), changing officers compensation by increasing stock options instead of salaries, and by making advertising expenditures that will have future impact.

Recommendation V-10. It is also suggested that all statements include controlled subsidaries as soon as they are profitable enough to have an impact on the earnings picture.

Problem. The Beginning Ratio analysis showed there may be sub-optimization in analysis of investment opportunities and the employment of assets.

Analysis. In any capital budgeting decision there is an implied cost of capital based on the heuristic applied in the decision and the received amount of risk. Although it is always difficult to explicitly establish a required rate of return, the following analysis does show the interactions of debt and equity costs in the sytem and can be used with some confidence to make judgements on expenditures.

Since changes in the percentage of debt to total capital are continuously occurring and since they are discontinous in nature, this analysis will assume the percentage of debt to total capital to be above the 30% that is found in the mature competitors and below the 54.5% in 1971. The expectations may be outlined by observing ratios in figure V-7, which oscillate around 40%. Therefore a 40/60 ratio of debt to equity will be assumed. The yearly rates

of return on equity for 1972 - 1976 are shown in table V-14.

Table V-14 PROJECTED RETURN ON EQUITY

Fiscal Year	Return on Equity (Book Value)
1972	8.5%
1973	10.0%
1974	11.7%
1975	13.4%
1976	14.3%

If the book values of expected equity are compared for 1976 and 1972 they imply an expected capital gain of 10.8% per year. If this expected average growth in value is added to the 1972 rate of return an after tax cost of equity capital can be determined.

- Cost of Equity Capital (Ke) = 8.5 + 10.8 = 19.3% -

The costs of debt, before taxes, for the period 1972 - 1976 can be assumed to be approximately 8%, based on historic average costs. Assuming a marginal tax rate of 50%, the after tax cost of debt is 4%. Therefore the weighted average cost of capital, before and after taxes can be given by the proportional additions done below in table V-15.

Table V-15 DEBT/EQUITY STRUCTURE

Type Capital	Cost (after taxes)	Portion in Structure	Weighted Cost
Debt	4.0%	40%	1.6%
Equity	19.3%	60%	11.6%
Total (Kc)			13.2%

Before Tax cost = $\left(\frac{1}{1 - \text{marginal rate}}\right)$ (After tax cost).

Before Tax cost = (2) (13.2%) = 26.4%

Obviously this final figure does not have the accuracy implied by the decimal placement but it may serve as a beginning hurdle rate for budgeting purposes.

Establishment of the hurdle or discount rate is important because the discounting of expected inflow by the cost of capital has two important advantages over the payback method. A discounting procedure permits management to include expected variations in the size of cash flows and the timing of expected flows in analysis. This type of method also allows management to quantify the risk of an expenditure simply by adding a risk factor to the cost of capital. Uncertainty of flows can also be included by adjusting discount rates upward for future flows or eliminating cash flows beyond the "foreseeable future."

The other advantages of such methodization are in the generation and comparison of investment alternatives. This is particularly important when capital must be rationed as is currently the case at FGI.

Recommendation V-11. Since FGI has the advantage of being closely held, direct communication with the stockholders is possible. Given this favorable situation, management should not accept the implied cost of capital that has been presented here. Rather, management should immediately determine the rate of return (after taxes) and the expected growth acceptable to stockholders and use this information along with the policies on the capital structure to establish a hurdle or discount rate for investment.

Recommendation V-12. Once the cost of capital is determined, this cost should be used in all budgeting decisions. This can be done if all capital expenditure requests include three estimates of cash flow. These should be the most probable value, the most optimistic value and the most pessimistic

or minimum value. These estimates can be used to assess the uncertainty and risk in each situation. These assessments can be used to adjust the discount rate and to eliminate totally uncertain flows from the calculations. Final analysis would take the following form:

PV = Present value of discounted cash flow

$r = Kc + \theta$

Kc = cost of capital (weighted average)

θ = risk adjustment

Cn = cash flow for n = 1, 2, ... , years

$$PV = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \frac{C_4}{(1+r)^4} + \frac{C_5}{(1+r)^5} + \cdots\cdots\cdots$$

total uncertain beyond 4 years

total uncertain beyond 3 years

total uncertain beyond 2 years

The present value compared to cost should be an integral part of the final decision.

The method is more flexible than the payback method now in use, and better suited for comparisons of proposals in a growing concern. But it should not be used as a single criteria for investment. Investments needed for survival still should be made with the management skill evidenced in FGI's 15 year history. However, Recommendation V-2 shows the need for a more intense procedure for the bulk of budgeting decisions.

Problem. The new marginal accounting system does not include comparative data between departments.

Analysis. The new marginal income accounting system, which replaced the standard cost system, is good for use in analysis of the contribution by product, but it does not directly show marketing and manufacturing control

information. The major variables in the system can be divided between these two functional areas. Specifically, variations can be observed in the market (Volume of sales), pricing, freight, material, labor, and material handling.

Recommendation V-13. We recommend that the new system integrate standard costing and contribution margins. This can be done by preparing variance reports as shown in Figure V-9 and V-10. (The standard data in these presentations were reduced from the March 1972 budget. All other information was extracted from the budget or actual marginal income report. The estimated time of transcription is 1 hour.) These two reports really just formalize the reduction of data that is now done by the individual managers.

Recommendation V-14. All accounting reports should include percentage variances by departments and monthly cumulative variances for comparison.

MARKETING VARIANCES

MONTH OF MARCH 1972

	#SALES (BUDGET)	# SALES (ACTUAL)	# VARIANCE	VARIANCE TO BUDGET (MARKET)	(#) PER # STD. *	ACTUAL ($) SALES AT STD.	ACTUAL ($) SALES	($) VARIANCE	VARIANCE TO STD (PRICE)	STD FREIGHT/#	FREIGHT AT STD	ACTUAL FREIGHT	VARIANCE	VARIANCE TO STD (FREIGHT)
MAT														
FORMAT	13310	6814	(6496)	(48.8%)	.724	4933	5484	551	11.2%					
ROVMAT	28165	49520	21365	76.0%	.625	26047	31111	5064	19.3%					
FILOMAT	63075	60804	(2271)	(3.7%)	.532	32347	38830	6483	20.0%					
OTHER														
TOTAL MAT	104540	117138	12598	12.0%	—	63327	75425	12098	19.2%					
WEAVE														
ROVCLOTH	209000	249270	40270	19.2%	.489	121893	119975	(1918)	(1.6%)					
LIASIL	11385	5076	(6309)	(55.5%)	.548	2782	2860	78	2.8%					
WIDE FABRIC	185	—	(185)	—	—	—	—	—	—					
TOTAL WEAVE	220570	254346	33776	15.3%	—	124675	122835	(1840)	(1.5%)					
FABMAT "C"	378615	340531	(38084)	(9.8%)	.530	180481	179709	(778)	(.4%)					
LIASIL FABMAT	15460	7752	(7708)	(49.7%)	.685	5310	5788	478	9.2%					
TOTAL	394075	348283	(45792)	(11.6%)	—	185791	185497	(300)	(.2%)					
RESALE														
NARROW FABRIC	1535	4275	2740	178.5%	.612	2616	1984	(632)	(24.2%)					
KEMAT	5770	13256	7486	129.5%	.480	6363	6487	124	1.9%					
GRAHAM	103230	153346	50116	48.7%	.522	80048	78854	(1194)	(1.5%)					
TOTAL	110535	170877	60342	54.5%	—	89027	87325	(1702)	(1.9%)					
GRAND TOTAL	829720	890644	60924	7.3%		462820	471082	(8262)	1.8%					

*(NOTE: STANDARD IS IMPLIED BUDGET RATE. TOTAL ACCURACY CAN BE ACHIEVED BY BREAKING EACH PRODUCT (BY WEIGHT) OUT SEPARATELY)

Figure V-9 Market Variance Report

MANUFACTURING VARIANCES

MONTH OF MARCH 1972

	1 MAT'L PER # STD	2 TOTAL MAT'L AT STD	3 ACTUAL MAT'L	4 VARIANCE	5 VARIANCE TO STD (MAT'L)	6 LABOR PER # STD	7 TOTAL LABOR STD.	8 ACTUAL LABOR	9 VARIANCE	10 VARIANCE TO STD (DIR. LABOR)	11 MAT'L HDL PER # STD	12 MAT'L HDL AT STD	13 ACTUAL MAT'L HDL	14 VARIANCE	15 VARIANCE TO STD (MAT'L HDL)	16
MAT																
FORMAT	.392	2671	2653	18	.6%	.057	388	430	(42)	(10.6%)	—	—	—	—	—	
ROVMAT	.351	17382	17458	(76)	(.4%)	.052	2575	2821	(246)	(9.5%)	—	—	—	—	—	
FILOMAT	.162	9850	10029	(179)	(1.8%)	.122	7418	6825	593	8.0%	—	—	—	—	—	
OTHER																
TOTAL MAT		29903	30140	(237)	(.8%)		10381	10076	305	3.0%			—			
WEAVE																
ROYCLOTH	.325	81013	79077	1936	2.4%	.040	9971	9614	357	3.6%	.011	2742	2742	—o—	—o—	
LIASIL	.386	1700	1754	(54)	(3.2%)	.046	233	9211	22	9.5%	.062	315	315	—o—	—o—	
WIDE FABRIC	1.39	—	—	—				—		—						
TOTAL WEAVE		82713	80831	1882	2.3%		10204	9825	379	3.7%		3057	3057	—o—	—o—	
FABMAT "C"	.338	115099	115103	(4)	—o—	.035	11919	12213	(194)	(1.6%)	.011	3746	3746	—o—	—o—	
LIASIL FABMAT	.372	2883	2892	(9)	—o—	.092	713	657	56	7.9%	.050	387	360	17	4.5%	
TOTAL		117982	117995	(13)	—o—		12632	12770	(138)	(1.1%)		4123	4106	17	.3%	
RESALE																
NARROW FABRIC	.562	2403	1807	596	24.8%	—	—	—	—	—	—	—	—	—	—	
KEMAT	.468	6204	6082	122	1.9%	—	—	—	—	—	—	—	—	—	—	
GRAHAM	.315	48305	49557	(1252)	(2.6%)	—	—	—	—	—	.128	19628	17968	1660	8.6%	
TOTAL RESALE		56912	57446	(534)	(.9%)	—	—	—	—	—		19628	17968	1660	8.6%	
GRAND TOTAL	—	287510	286412	1098	.4%		33217	32671	546	1.6%		26808	25131	1677	6.2%	

Figure V-10 Manufacturing Variance Report

PART VI

CONCLUSIONS

CONCLUSIONS

By the very nature of this report, emphasis has been placed on FGI's weaknesses rather than its strengths. Since the report is for FGI's internal use, only, no attempt has been made to present a balanced picture of the company. However, the strengths should be of primary concern when changes are being considered in order to avoid destroying these valuable company "assets."

FGI's assets in people include a core of loyal workers who have served the company since its beginning and a group of managers who are devoted to the company's success. Technical expertise and knowledge are evident throughout the ranks of management.

The present size and capacity of the plant are strengths that can be exploited whenever further expansion is desired. FGI's tradition of flexibility in production, financing, and shipping to meet customer needs is probably a large factor in its success. The tradition of creativity and innovation upon which the company was founded must be maintained and developed.

FGI was founded on innovative talent. In this regard, Mr. Dildilian should consider a role that concentrates his efforts on Research and Development to maintain their new product development program which is critical to future growth.

Recommendations made are not intended to be implemented as mutually exclusive events in their entirety. Instead, as interdependent factors they must be evaluated and implemented as perceived by management.

This study has been conducted from an internal review of FGI. Additional study and analysis of FGI's operations from the customer/distributor viewpoint should be considered. This added information will complete the picture of FGI's managerial practices.

FGI's strengths have been kept in mind in formulating the recommendations for this study. FGI's future depends on growth based on these strengths, thus, it is imperative that these strengths be considered in implementing any of the recommendations.

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