# DETERMINATION OF THE THREE MOST INADEQUATE FOOD PACKAGES, REDESIGNS AND SPECIFICATIONS FOR MORE ADEQUATE PACKAGES

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Donald Eugene Barnes

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# DETERMINATION OF THE THREE MOST INADEQUATE FOOD PACKAGES, REDESIGNS AND SPECIFICATIONS FOR MORE ADEQUATE PACKAGES

By

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A THESIS

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# PREFACE

The purpose of this thesis is to present a solution and approach to a typical packaging problem which would be found in the food industry. Packaging has grown from a baby to a towering giant in a period of about two decades. This is not to say that packaging problems did not exist prior to this time--but that they were not recognized for what they were. Today, however, industries the world over are awakening to the dynamic affect "the package" is having upon their profits if not their existence.

This approach should be looked upon as a philosophy rather than a scientific formula. Such a philosophy was clearly stated by Frank Gianninoto who said, "packaging is like shaving. If you don't do something about shaving every day, pretty soon you are a bum."[1] By adopting such a philosophy and utilizing the scientific tools provided by marketing, advertising, chemistry, physics, engineering, and research the author feels that tremendous strides can be made in the solution to packaging problems.

The writer of this thesis is deeply indebted to the Tee-Pak Company of Chicago, Illinois for making it possible for him to continue his graduate studies. Also, he would like to express his appreciation for the selection of a thesis title which made it possible to delve into the many areas encountered in the solution to a package design problem.

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[1]Frank Gianninoto, "I Get Into Everyone's House," Saturday Evening Post, April 2, 1955, p. 115.

Dr. James Goff, Dr. Harold Raphael, and Mr. Hugh Lockhart of the School of Packaging, Michigan State University, furnished valuable suggestions and guidance throughout the preparation of this paper. Their keen interest and knowledge of current publications helped keep the author up-to-date with the rapidly changing packaging field.

This paper would not have been possible without the cooperation of the food packers, food retailers and wholesalers, and the ultimate consumers who furnished information--often of a highly confidential nature--in regards to this problem.

Finally, the author would like to thank his wife and parents for their understanding, patience, and encouragement throughout the preparation of this paper.

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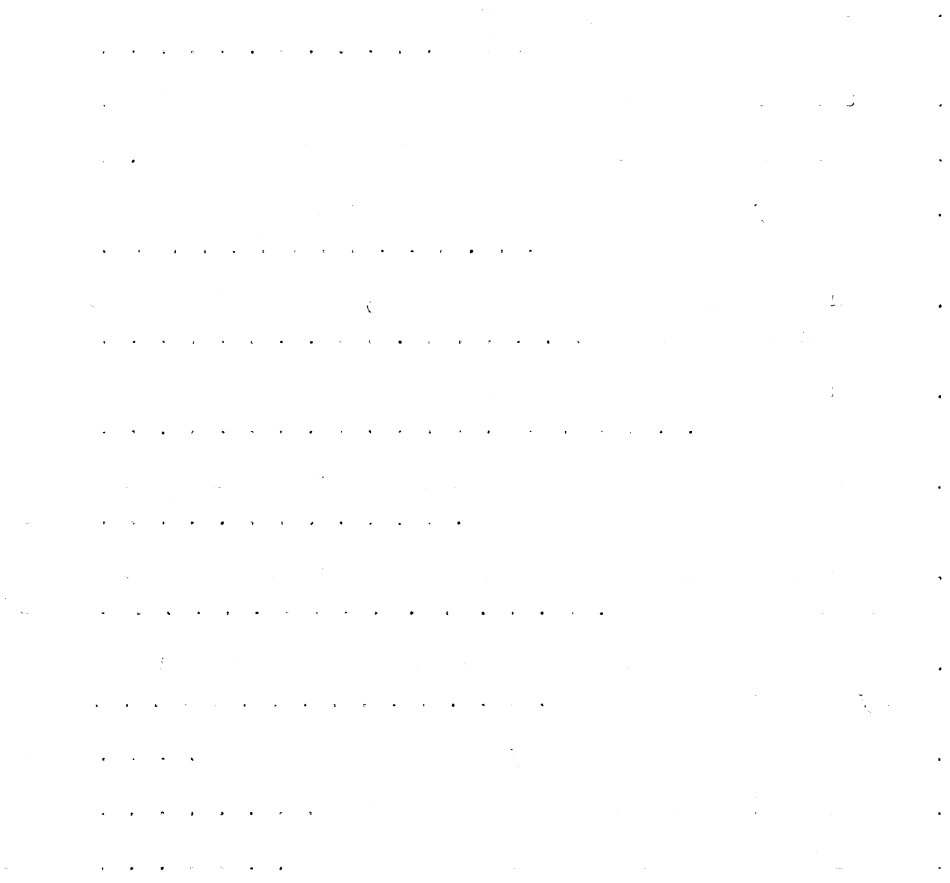

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# INTRODUCTION

The question has often been asked, "Why is packaging playing such a predominate role in our industries today?" The answer to this question can be made after looking back into history to determine what conditions brought about this revolution.

Looking back at our early American pioneers prior to the twentieth century, they were found in an agricultural setting. They were for the most part, hardy souls, on fertile and well established farms. In general, they raised their own food, made their own clothes, built their own homes, and made many of their own tools. Occasionally they would journey to the distant general store to purchase industrial products such as hardware, shoes, some clothing, and some foodstuffs. The early American industrial efforts were, at this time, confined to producing enough of these products to fill the needs of these people.

The American tradition of healthy competition, however, resulted in tremendous improvements in industrial goods. Soon the agricultural workers found that many of their home products could not compare with similar industrially produced goods. Consequently, a situation arose where demand far exceeded supply. The rush to get as many products as possible into this demanding market resulted in large bulk packages in the form of barrels, heavy wooden crates, kegs, and bundles.

After the turn of the century, industry began closing the gap between supply and demand. This was accomplished by the American

people's inventive and scientific genius and their relish for hard work, machines, power, and transportation. As time passed, the tables were turned and demand no longer exceeded supply.

> . . . When supply exceeded demand and competition between products began asserting itself for the consumer's dollar, then packaging was called upon to solve the difficult problem of profitably selling the wide variety and tremendous volume of goods our factory owners and operators had so well learned to make.[2]

Now that industry has become aware of the importance of packaging, one would assume that there exists well integrated packaging programs. Unfortunately, however, this is not the case as is illustrated by the statement made by a salesman for a large national packaging supplier to the author of the Selling Power of Packaging:

> These crazy mixed-up organizations I call on. You never know from one company to the next who is responsible for the packaging. One time it's the purchasing agent, then it's someone in the production end. Or again in sales, in advertising, or it may be the president, the treasurer, a package-development director, or a packaging committee.[3]

One possible reason for this condition is that upon sudden realization of the importance of packaging, our industries in a frenzy to meet this challenge organized their packaging program without proper thought and understanding. The fact that packaging involves almost every department throughout the organization only made matters worse. The question soon arose, "Where does packaging responsibility

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[2]William F. Deveneau, Orientation Lectures on the Manufacture of Folding Cartons, Prepared for Folding Paper Box Industry Education Commission (Chicago: Folding Paper Box Association of America, 1956), pp. 3-4.

[3]Vernon L. Fladager, The Selling Power of Packaging (New York: McGraw Hill, 1956), p. 79.

lie?" The attempt to answer this question has resulted in new positions such as the "packaging engineer" or "coordinator" and the reorganization of many of our leading companies. For example, one of the large food manufacturing companies has recently reorganized and included a packaging group which is headed by the Vice President of Packaging.

Because this study is concerned with package design, the author will concentrate his efforts in this area of the packaging program. One might assume that in order to design a package, it is only necessary to follow the approach set forth by industry. However, again the same old problem is found. There are about as many approaches to package design as there are companies utilizing packaging. In one case it is done by the artist, in another the marketing group, in another the advertising group, and yet in another by the engineering group. It was the contention of the author that this problem should be approached by the coordination of all these departments by a packaging designer; so therefore, this approach will be used for this paper.

The problem of determining the most inadequate food packages was done in conjunction with marketing techniques. The opinions of the people affected by these inadequate packages were sought through a series of surveys. Their opinions brought to light which packages were inadequate and the reasons for their inadequacies.

Once these packages had been determined, several designs were completed in order to alleviate the most undesirable characteristics of the present packages. This was done with due consideration for economic and production factors. This, of course, required advice and knowledge from many different areas.

After designs were completed which were considered adequate, specifications were written. Again you might assume that this is merely a case of following a standard which had been prepared by industry. But in the words of Dr. James W. Goff, "There is no such thing as an adopted standard specification in the packaging industry." His statement was strongly supported by the absence of such standards in a search through packaging publications. The specifications for the newly designed packages are based upon the criteria that the author feels is needed by a package supplier in order to produce the desired package.

# PART I

# DETERMINATION OF THE INADEQUATE FOOD PACKAGES

# CHAPTER I

## DEVELOPMENT OF SURVEYS

### Areas and Samples Determined

In order to determine the three most inadequate food packages, the opinions of the people who were directly affected by these packages was certainly needed. To determine just who these people were required a knowledge of the channel of distribution which these packages followed. The main channels of distribution were as follows:

1) Manufacturer direct to household consumer.
2) Manufacturer to retailer to consumer.
3) Manufacturer to wholesaler to retailer to consumer.
4) Manufacturer to agent middleman to wholesaler to retailer to consumer.[4]

The third type of channel of distribution is the most widely used by the food industry. Because of the growth of the supermarket, however, the second channel has gained in importance.

It will be noticed that the first party in each type of channel of distribution is the manufacturer. In dealing with the packaged food industry, the manufacturer can be considered the food packer. This is based upon the fact that at this point the food and package are combined into one unit--a merchandising unit. Therefore, the manufacturer or food packer was selected as the first group in which to

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[4]Phillips and Duncan, Marketing, Principles and Methods (Homewood, Illinois: Richard D. Irwin Co., 1959), p. 565.

seek opinions in regard to the inadequate food packages.

The packaged foods are generally sent from the manufacturer to the wholesaler. At this point the goods are stored for further distribution to retailers. The biggest problems of the wholesaler are caused by inadequate shipping containers rather than the ultimate food package. However, the opinions of the wholesalers could not be overlooked.

The wholesaler breaks down the larger orders and distributes them in smaller quantities to the individual retailers. It is at this point that the food package takes over and plays a very important role. Because of this important role, the opinions of the retailers were of the utmost importance.

From the retailers shelves, the package finds its way into the hands of the ultimate consumer. Nowhere is there a greater critic and expert on the inadequacies of a package than the ultimate consumer. Therefore, their opinions were considered to be invaluable.

After determining in which areas the opinions would be asked, it was necessary to determine the sample size and method of gathering information. After evaluating the various methods for obtaining marketing information, the author decided that the information obtained from food packers, wholesalers, and retailers should be gathered on a national level by questionnaires distributed by mail.[5] It was also decided that the sample members should be selected at random from the population given in the Food Products Directory.[6]

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[5]Albert B. Blankenship, How to Conduct Consumer and Opinion Research (New York: Harper and Brothers, 1946), pp. 16-17 and 22-24.

[6]Western Canner and Packer, United States Food Products Directory (Chicago: Miller Freeman Publication, 1955), pp. 1-180 and 469-488.

This directory gives a very complete list of food packers, wholesalers, and retailers throughout the United States.

Because of economic factors, it was decided that the consumer surveys could not be carried out on a national level. Instead, the population was initially broken up into areas and a number of these areas were selected as an unrestricted random sample. This method is known as an unrestricted area sampling.[7] It was also decided to use questionnaires distributed either by hand or mail.

After determining the sample area and the method to be used for gathering data, questionnaires were prepared for each area. The questionnaires were carefully developed in accordance with the specifications set forth by accepted marketing principles.[8]

## Questionnaire for Food Packers

Three hundred and twenty-five questionnaires were sent out to the food packers. They were sent to every state in the United States because it was felt that problems may be present in one state which were not in another. Such problems could be the availability of materials and packages or those brought about by different atmospheric conditions. Care was taken to maintain equilibrium in the concentration of questionnaires sent to each area of the food packaging industry. An illustration of this questionnaire and the cover sheet can be seen in Figure 1.

Before developing a questionnaire for the food packers, a study was made to determine the food packers functions. Only by doing

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[7]Ernest S. Bradford, Marketing Research (New York: McGraw Hill, 1951), p. 334.

[8]Phillips and Duncan, op. cit., pp. 518-521.

FIGURE 1

QUESTIONNAIRE SENT TO THE
FOOD PACKERS

FIGURE 1

School of Packaging
Bldg. B-4, South Campus
Michigan State University
East Lansing, Michigan

Dear Sir:

As one of the progressive companies in the food packaging industry, you are undoubtedly interested in the research work being done in your field. Therefore, I am writing to you in regards to my work.

At present, I am a Special Graduate Research Assistant at the School of Packaging, Michigan State University. In our Masters Degree Program, we are required to write a thesis. It is felt that this will better prepare us to understand and solve problems that would be encountered by a person in the packaging industry.

The problem that I have been assigned is as follows:

> . . . determine the three most inadequate food packages in use today--redesign and write specifications for more adequate packages. . . .

As you can see this problem is quite general in nature, but is closely allied with a problem that would be found in industry.

In order to most effectively solve the problem of determining the three most inadequate packages, the advice of the experts who are currently faced by the problems of the food packaging industry is certainly needed. I feel that this advice supported by the opinions of the package supplier, retailer, and housewife will make an accurate determination possible.

You can be very helpful in solving this problem by filling out and returning the enclosed questionnaire. Whatever information you send will be kept strictly "confidential." Also, you will receive word as to any information brought about by my research which could be of value to you and your company.

I am looking forward to hearing from you. Thank you very much for your cooperation.

Cordially yours,

Donald E. Barnes
Special Graduate Research Ass't

FIGURE 1 - Continued

Date: _____

To: Mr. Donald E. Barnes
School of Packaging
Bldg. B-4, South Campus
Michigan State University
East Lansing, Michigan

Name of company: _____

Address: _____
street city state

Your opinion of the three most inadequate food packages:

A. _____

B. _____

C. _____

Reasons for inadequacy: (check)

| A | B | C | | |
|---|---|---|---|---|
| | | | 1. | Product Characteristics |
| | | | | a. Physical form |
| | | | | b. Protection required |
| | | | 2. | Materials |
| | | | | a. Appropriateness |
| | | | | b. Structural adequacy |
| | | | | c. Availability |
| | | | | d. Cost |
| | | | 3. | Packaging line |
| | | | | a. Equipment |
| | | | | b. Personnel |
| | | | | c. Design and structure of package |
| | | | 4. | Convenience factors |
| | | | | a. Preproduction |
| | | | | b. Packaging and shipment |
| | | | | c. Distribution |
| | | | 5. | Appearance |
| | | | | a. Identity |
| | | | | b. Information |
| | | | | c. Attention |

Additional information:

Thank you very much for your cooperation.
Please return this form before January 18, 1960

this was it possible to understand where problems may arise which would lead to inadequate packages. After completing such a study, it was found that the manufacturers' packaging problems would, in very general terms, lie within the nature of the product, packaging materials, filling lines, or distribution procedures. By expanding upon these functions with several subdivisions, it was possible to prepare a check-list for the questionnaire. This check-list does not provide exact answers. However, when the nature of the product and package was known, by cross-reference and interpolation, accurate determinations are possible. Examples of such determinations are presented later in the evaluation of these questionnaires.

## Questionnaire for Wholesalers and Retailers

The questionnaire for the wholesaler was combined with that of the retailer. This was done because of the directory used to obtain the populations for this research. This directory combined these two points in the channel of distribution. This was done by giving the address of the wholesaler who served a chain of retail stores. By taking advantage of this, it was possible to combine the questionnaires and to obtain the opinions of the sales managers who could speak for a wholesaler as well as several retailers. There were four hundred and twenty-five questionnaires sent to the wholesalers. These questionnaires also represented approximately three thousand food retailers. This questionnaire and the cover sheet can be seen in Figure 2.

The development of this questionnaire was based upon the functions of the package in these areas of the channel of distribution. These were found to involve warehouse and stockroom storage, shelf stacking

FIGURE 2

QUESTIONNAIRE SENT TO THE
WHOLESALERS AND RETAILERS

FIGURE 2

School of Packaging
Bldg. B-4, South Campus
Michigan State University
East Lansing, Michigan

Dear Sir:

The development of Packaging has brought about a revolution in food distribution. As a successful manager, you have no doubt taken advantage of the opportunities that packaging has offered in self-service, impulse buying, better inventory control, better product protection, larger range in product lines, etc. Further development will enable you to realize even greater advantages which will ultimately lead to greater profits. Because of the importance of packaging research to your business, I am writing to you in regard to my work.

At present, I am a Special Graduate Research Assistant at the School of Packaging, Michigan State University. In our Masters Degree Program, we are required to write a thesis. It is felt that this will better prepare us to understand and solve problems that would be encountered in the packaging industry.

The problem I have been assigned is as follows:

> . . . determine the three most inadequate food packages in use today--redesign and write specifications for more adequate packages. . . .

As you can see, this problem is directly related to food distribution.

In order to most effectively determine the three most inadequate food packages, the advice of the people throughout the channel of distribution is certainly needed. The opinion of the retailer and the wholesaler are of the upmost importance as they generally suffer the effects of an inadequate package.

With this in mind, I feel that the opinions of the retailer and wholesaler have not been given proper consideration in regard to package development. Therefore, I am writing to you in regards to my research. You may be of great help by filling out and returning the enclosed questionnaire. In return, I hope that my research will result in packages which will help you overcome some of your present packaging problems.

I am looking forward to hearing from you. Thank you very much for your cooperation.

Cordially yours,

Donald E. Barnes
Special Graduate Research Ass't

FIGURE 2 -- Continued

Date: _____

To: Mr. Donald E. Barnes
School of Packaging
Bldg. B-4, South Campus
Michigan State University
East Lansing, Michigan

Name of Company: _____

Address: _____
street city state

Your opinion of the three most inadequate food packages:

A. _____

B. _____

C. _____

Reasons for inadequacy: (check)

| A | B | C | | |
|---|---|---|---|---|
| | | | 1. | Storage |
| | | | | a. stacking |
| | | | | b. handling |
| | | | | c. identification |
| | | | 2. | Shelf |
| | | | | a. display |
| | | | | b. price marking |
| | | | | c. sales promotion |
| | | | | d. stacking |
| | | | | e. inspection |
| | | | 3. | Protection |
| | | | | a. pilferage |
| | | | | b. light |
| | | | | c. humidity |
| | | | | d. handling |
| | | | | e. corrosion |
| | | | | f. mold |
| | | | | g. leakage |
| | | | 4. | Appeal |
| | | | | a. Identity |
| | | | | b. information |
| | | | | c. attention |

Additional information:

Thank you very much for your cooperation.
Please return this form before January 18, 1960.

and adaptability, protection given the product, and ability to sell the product. These general areas were again supported by several subdivisions for the purpose of preparing the check-list.

## Questionnaire for Ultimate Consumer

The surveys were completed by the distribution of four hundred questionnaires to the ultimate consumers. These were distributed in the Lansing and Flint areas. It is almost impossible to say how many people these represented as no attempt was made to determine the exact size of the families approached. However, because of the great deal of interest shown, it was obvious that each returned questionnaire contained the opinion of more than one person. This questionnaire can be seen in Figure 3.

The development of this questionnaire was based upon the function of the package in this area. These functions were found to be convenience to the user, protection of the product, ability to be stored, and the appeal of the package to the consumer. Several subdivisions were used in conjunction with these general areas to make up a check-list which helped in the determination of package inadequacies in this area.

In conclusion, it should be pointed out that three surveys have been conducted for the purpose of determining the three most inadequate food packages and the reasons for their inadequacy. The surveys which have been conducted are as follows:

1) 325 questionnaires to food packers.
2) 425 questionnaires to wholesalers representing approximately 3,000 retailers.
3) 400 questionnaires to families who are the ultimate consumers of food.

FIGURE 3

QUESTIONNAIRE SENT TO THE
ULTIMATE CONSUMER

FIGURE 3

School of Packaging
Building B-4, South Campus
Michigan State University
East Lansing, Michigan

Dear Consumer,

As an ultimate consumer of food, you are undoubtedly familiar with the many shortcomings of our present day food packages. One aspect of my research work has been to--"determine the three most inadequate food packages in use today." I have turned to the food packers, food retailers, and ultimate consumers for information and advice which will be useful in the determination of these packages. The ultimate consumer is affected by these packages more than any other group; so therefore their opinions can be considered as that of an "expert."

You can help a great deal by simply giving your opinion of the three most inadequate food packages and checking the reasons for their inadequacy on the following questionnaire. The packages you select do not have to be given by a brand name but simply by the type of package used.

Your opinion of the most inadequate packages:

A.

B.

C.

Reasons for inadequacy: (check)

| A | B | C | |
|---|---|---|---|
| | | | 1. Convenience of package |
| | | | a. Hard to store due to shape or size. |
| | | | b. Hard to open. |
| | | | c. Hard to dispense product. |
| | | | d. Hard to reclose for further use. |
| | | | e. Unsafe or messy to handle. |
| | | | f. Hard to measure out accurate quantity. |
| | | | g. Improper unit size. |
| | | | 2. Inadequate protection |
| | | | a. Product spills or sifts. |
| | | | b. Product becomes stale or spoils. |
| | | | c. Product is subject to temperature or humidity change. |
| | | | d. Excessive breakage. |
| | | | 3. Package appearance |
| | | | a. Not pleasing to the eye. |
| | | | b. Hard to identify in store or at home. |
| | | | c. Unable to inspect product. |

Thank you very much for your cooperation.

Cordially yours,

Donald E. Barnes

# CHAPTER II

## EVALUATION OF THE SURVEYS

### Evaluation of Nature and Number of Returns

Before getting into the evaluations of the inadequate packages some comment will be made upon the number and nature of the returned questionnaires. The food packers returned thirteen percent of the questionnaires. While this percentage is considered a fair return for a questionnaire distributed by mail, it is felt that this is low for a questionnaire being conducted for the purpose of research.

The first impression was that the reason for this low return was due either to an inadequate questionnaire or to a poor sampling. After carefully evaluating the nature of the returns, however, it is believed that this is not the case. The first evidence was the enthusiasm displayed by those who returned the questionnaires. In many cases they went far beyond what was called for. For example, one large meat packing company went so far as to duplicate the questionnaire and return eight replies from different sources. Also contributing to making this point clearer was the fact that some of the companies returned letters claiming that all of their packages were quite adequate. Still others merely sent letters claiming that they did not know enough about packaging to complete the questionnaire. Therefore, a review of the nature of this survey brought out some interesting facts. First, a small percentage of the food packaging companies have adopted the philosophy that there is no such thing as a completely adequate

package. Second, few companies have well integrated packaging programs. Third is the factor which involves human nature. It is understandable that a person who is responsible for a packaging program would not want to admit to himself, let alone someone else, that his packages are inadequate. It is unfortunate that this questionnaire had to be of this nature, but only by getting to the bottom of some hard to face facts can this type of research be carried on.

The most disappointing area of the surveys was that of the wholesaler and retailer. These brought a return of nine percent of the four hundred and twenty-five which were sent out. Through many publications and the Food Packaging Council bulletins, these people have shown a great deal of interest in packaging and have not hesitated to voice their objections to present packages. Therefore, it is felt that the lack of a larger return was due, in the most part, to the nature of the sample taken. It is felt that future surveys should be directed toward the individual retail store managers and workers. This is based upon the fact that the retail manager must shoulder the force of an inadequate package both from the retail and consumer level. The sales managers for the wholesalers who service these retailers often hear the complaints about inadequate packages, but are not on hand to see and get this information first hand. Consequently, an attempt to obtain opinions from a larger sample apparently suffered because these opinions were not sought in their own back yard.

The consumer survey resulted in a somewhat fantastic return of sixty-four percent of the four hundred distributed. It was interesting to note that there was very little difference in the percentage of returns by mail and those delivered and picked-up by hand. The ultimate consumer, for the most part the housewife, took advantage of

this opportunity to object to the packages which had frustrated him or her for so many years. In many cases, notes were written on the back of the questionnaire which gave additional valuable information.

The total return of the surveys in all areas was twenty-nine percent. A breakdown of this information is shown in Table 1. It is felt that the number of returns was large enough to make a valid determination of the inadequate packages and the reason for their inadequacies.

## Inadequate Packages Determined

The first step in the evaluation of these surveys was to determine in which general areas the greatest number of inadequate packages appeared. This was accomplished by breaking the food industry down into the general areas as shown in Table 2. Each individual survey was then studied and the packages which were listed as inadequate were recorded in their proper area. Upon completion the results were tabulated to determine in which areas the greatest number of inadequate packages appeared.

In examining the chart, it was interesting to note that in almost all cases the packages which received the greatest number of complaints were the same types for each of the three areas surveyed. By adding the totals of each of the areas, it was found that the major areas were as follows:

| Product | Total |
|---|---|
| Meat -- pre-packed | 89 |
| Fruit -- frozen | 30 |
| Vegetables -- fresh | 29 |
| Baked goods -- dry packed | 48 |
| Dairy -- pre-packed | 68 |
| canned | 35 |
| Miscellaneous -- canned | 107 |
| pre-packed | 340 |
| Total | 736 |

TABLE 1

PERCENTAGE OF SURVEYS RETURNED IN THE THREE AREAS OF THE CHANNEL OF DISTRIBUTION

FOOD PACKERS

| | |
|---|---|
| Total number of questionnaires delivered by mail | 325 |
| Total number returned | 41 |
| Percent returned | 13% |

WHOLESALERS AND RETAILERS

| | |
|---|---|
| Total number of questionnaires delivered by mail | 425 |
| Total number returned | 38 |
| Percent returned | 9% |

ULTIMATE CONSUMER

| | By Mail | By Hand | Total |
|---|---|---|---|
| Questionnaires delivered | 100 | 300 | 400 |
| Questionnaires returned | 61 | 194 | 255 |
| Percent returned | 61% | 65% | 64% |

RESULTS OF THREE SURVEYS

| | |
|---|---|
| Total number of questionnaires delivered | 1150 |
| Total number returned | 334 |
| Percent returned | 29% |

TABLE 2

RESULTS OF INADEQUATE PACKAGES IN GENERAL AREAS

| Product | Packer | Retailer | Consumer | Total |
|---|---|---|---|---|
| Meat | | | | |
| Frozen | 4 | 1 | 4 | 9 |
| Canned | 2 | - | 6 | 8 |
| Pre-packed | 7 | 8 | 74 | 89 |
| Fresh | 3 | 2 | 8 | 13 |
| Fruit | | | | |
| Frozen | 7 | 3 | 20 | 30 |
| Canned | 1 | 1 | 13 | 15 |
| Dry packed | 3 | 1 | 6 | 10 |
| Fresh | - | 1 | 8 | 9 |
| Vegetables | | | | |
| Frozen | - | 4 | 14 | 18 |
| Canned | 2 | 4 | 9 | 15 |
| Dry packed | 4 | 9 | 14 | 23 |
| Fresh | 7 | 3 | 19 | 29 |
| Baked Goods | | | | |
| Frozen | 4 | 1 | - | 5 |
| Canned | - | - | - | - |
| Dry packed | 3 | 2 | 43 | 48 |
| Fresh | - | - | - | - |
| Miscellaneous | | | | |
| Frozen | 6 | - | 19 | 25 |
| Canned | 14 | 4 | 83 | 107 |
| Pre-packed | 17 | 28 | 295 | 340 |
| Fresh | - | - | - | - |
| Dairy | | | | |
| Frozen | 4 | - | - | - |
| Canned | 7 | 1 | 27 | 35 |
| Dry packed | 8 | 1 | 59 | 68 |
| Fresh | - | - | - | - |
| Total | 103 | 74 | 721 | 908 |

The above listed areas accounted for eighty-one percent of the total number of inadequate packages mentioned in the surveys.

A refined version of this table was then constructed with the emphasis being placed upon the areas showing the greatest concentration of inadequate packages. The questionnaires were again studied and the packages which fell into any of these classes were recorded as shown in Table 3.

By totaling the points again in a manner as previously described, the following five packages were determined the most inadequate:

| Product | Total |
|---|---|
| Meat -- Bacon | 43 |
| Miscellaneous -- | |
| Cereal box | 64 |
| Cellophane bag for (noodles, rice, etc.) | 52 |
| Sugar-flour bag | 84 |
| Brown sugar box | 42 |
| Total | 285 |

It was decided to work with five rather than three packages because of the possibility of circumstances which might make it impossible or undesirable to redesign one or more of these packages as the development of new packages is continued. In order to get a clearer picture, Table 4 was constructed to determine at what percent each of these five packages appeared in their respective areas.

## Reasons for Inadequacies Determined

After determining the five most inadequate packages, it was necessary to determine what characteristics made these packages inadequate in each area. This was accomplished by a series of

TABLE 3

RESULTS OF INADEQUATE PACKAGES IN REFINED AREAS

| Product | Packer | Retailer | Consumer | Total |
|---|---|---|---|---|
| Meat | | | | |
| Bacon | 3 | 4 | 36 | 43 |
| Lunch | 1 | 1 | 15 | 17 |
| Fruit | | | | |
| Frozen | 5 | - | 16 | 21 |
| Vegetables | | | | |
| Potato sack | 4 | 4 | 15 | 23 |
| Dairy | | | | |
| Milk | 6 | 2 | 25 | 33 |
| Cheese -- sliced | - | - | 11 | 11 |
| bulk | 2 | 1 | 23 | 26 |
| Ice cream | 2 | - | 12 | 24 |
| Baked goods | | | | |
| Bread | 3 | 2 | 31 | 36 |
| Miscellaneous | | | | |
| Cellophane bag (rice, noodles, etc.) | 4 | 13 | 35 | 52 |
| Sugar-flour bag | 4 | 8 | 66 | 78 |
| Brown sugar box | - | - | 42 | 42 |
| Cereal | 4 | 3 | 57 | 64 |
| Cake mix | 2 | 2 | 11 | 15 |
| Cans -- coffee | 1 | 2 | 13 | 16 |
| spice | 3 | 1 | 8 | 12 |
| pry-off lids | 2 | - | 13 | 15 |
| Bleach | - | 1 | 9 | 10 |
| Soup powder | 1 | 1 | 26 | 28 |
| Cookies | 1 | 3 | 8 | 12 |
| Total | 44 | 49 | 472 | 565 |

TABLE 4

FREQUENCY OF THE FIVE MOST INADEQUATE PACKAGES IN THEIR RESPECTIVE AREAS

| Product | Packer | Retailer | Consumer |
|---|---|---|---|
| Meat | | | |
| Pre-packed | 7 | 8 | 74 |
| Bacon | 3 | 4 | 36 |
| Frequency | 19% | 36% | 39% |
| Miscellaneous | | | |
| Dry packed | 17 | 28 | 295 |
| Cellophane bag | 4 | 13 | 35 |
| Frequency | 24% | 46% | 12% |
| Miscellaneous | | | |
| Dry packed | 17 | 28 | 295 |
| Cereal | 4 | 3 | 57 |
| Frequency | 24% | 11% | 19% |
| Miscellaneous | | | |
| Dry packed | 17 | 28 | 295 |
| Brown sugar box | - | - | 42 |
| Frequency | - | - | 14% |
| Miscellaneous | | | |
| Dry packed | 17 | 28 | 295 |
| Sugar-flour bag | 4 | 8 | 66 |
| Frequency | 24% | 29% | 22% |

three tables. These are shown in Tables 6, 7, and 8. The tables were set up in the same order as the check-list on each questionnaire. The questionnaires were then studied and the number of times that each characteristic was checked was recorded in the appropriate table. Therefore, in examining these tables the presence of a large number at a particular characteristic in any area is evidence of a point of inadequacy. Table 5 was prepared so that the packages could be judged, not only by the number of times they appeared on the questionnaires, but also by the degree in which each package was felt inadequate. In order to do this, a point was scored for each time a characteristic was checked inadequate in the three different areas. The total sum of the points for each of the five packages in each area was dependent upon--(1) the number of times each package was listed as inadequate, and (2) the number of characteristics checked as reasons for this inadequacy.

These tables are put to further use in the following chapter which involves the development of the new designs. In concluding, it is felt that by utilizing the tools of marketing an accurate determination of the most inadequate packages and the reasons for their inadequacy has been accomplished. This section also serves to illustrate the importance of the need for close coordination between packaging and marketing groups.

TABLE 5

EVALUATION OF DEGREE OF INADEQUACY OF THE FIVE MOST INADEQUATE PACKAGES

| Product | Consumer | Retailer | Packer | Total |
|---|---|---|---|---|
| Bacon | 100 | 14 | 9 | 123 |
| Sugar-flour bag | 240 | 48 | 14 | 302 |
| Brown sugar box | 109 | -- | -- | 109 |
| Cereal Box | 178 | 5 | 10 | 193 |
| Cellophane bag | 197 | 53 | 12 | 262 |

TABLE 6

EVALUATION OF THE REASONS FOR INADEQUACIES FROM THE FOOD PACKERS

| Characteristic | Bacon | Sugar flour bag | Brown sugar box | Cello bag | Cereal box |
|---|---|---|---|---|---|
| I. Product Characteristics | | | | | |
| a. physical form | - | 1 | - | - | 1 |
| b. protection req | 1 | 2 | - | 1 | 3 |
| II. Materials | | | | | |
| a. Appropriateness | 1 | - | - | 1 | 1 |
| b. Structural adeq. | 2 | 4 | - | 4 | - |
| c. Availability | - | - | - | - | - |
| d. Cost | - | - | - | - | 1 |
| III. Packaging Line | | | | | |
| a. Equipment | - | - | - | - | 1 |
| b. Personnel | - | - | - | - | - |
| c. Design and structure | 3 | 2 | - | 2 | 3 |
| IV. Convenience Factors | | | | | |
| a. Preproduction | 1 | - | - | - | - |
| b. Packaging and shipping | - | 2 | - | - | - |
| c. Distribution | 1 | 1 | - | - | - |
| V. Appearance | | | | | |
| a. Identity | - | - | - | - | - |
| b. Information | - | - | - | - | - |
| c. Attention | 2 | 2 | - | 2 | - |
| Total | 9 | 14 | 0 | 12 | 10 |

TABLE 7

EVALUATION OF THE REASONS FOR INADEQUACIES FROM THE WHOLESALERS AND RETAILERS

| Characteristic | Bacon | Sugar flour bag | Brown sugar box | Cereal box | Cello bag |
|---|---|---|---|---|---|
| I. Storage | | | | | |
| a. Stacking | - | 6 | - | 2 | 4 |
| b. Handling | - | 3 | - | - | 2 |
| c. Identification | - | - | - | - | 1 |
| II. Shelf | | | | | |
| a. Display | 2 | 2 | - | - | 8 |
| b. Price marking | - | 4 | - | 2 | 5 |
| c. Sales promotion | 4 | - | - | - | - |
| d. Stacking | 3 | 2 | - | - | 13 |
| e. Inspection | - | 1 | - | - | 1 |
| III. Protection | | | | | |
| a. Pilferage | - | - | - | - | 1 |
| b. Light | 1 | - | - | - | 1 |
| c. Humidity | - | 4 | - | 1 | - |
| d. Handling | - | 6 | - | - | 4 |
| e. Corrosion | - | - | - | - | - |
| f. Mold | - | - | - | - | - |
| g. Leakage | - | 7 | - | - | 4 |
| IV. Appeal | | | | | |
| a. Identity | - | 4 | - | - | 4 |
| b. Information | 1 | 4 | - | - | 3 |
| c. Attention | 4 | 5 | - | - | 2 |
| Total | 14 | 48 | 0 | 5 | 53 |

TABLE 8

EVALUATION OF THE REASONS FOR INADEQUACIES FROM THE ULTIMATE CONSUMER

| Characteristic | Bacon | Sugar flour bag | Brown sugar box | Cereal box | Cello bag |
|---|---|---|---|---|---|
| I. Convenience | | | | | |
| a. Storage | 8 | 14 | 4 | 11 | 23 |
| b. Opening | 16 | 18 | 7 | 22 | 16 |
| c. Dispensing | 8 | 36 | 14 | 25 | 14 |
| d. Reclosing | 32 | 34 | 15 | 30 | 37 |
| e. Handling | 8 | 31 | 5 | 9 | 16 |
| f. Measuring | 2 | 17 | 7 | 7 | 10 |
| g. Size | - | 1 | 2 | 4 | 3 |
| II. Protection | | | | | |
| a. Spilling and sifting | - | 40 | 9 | 13 | 31 |
| b. Stale or spoils | 9 | 14 | 20 | 24 | 15 |
| c. Temperature and humidity | 1 | 14 | 22 | 20 | 12 |
| d. Breakage | - | 4 | 1 | 2 | 15 |
| III. Appearance | | | | | |
| a. Not pleasing | 8 | 9 | 2 | - | 3 |
| b. Hard to identify | 1 | - | - | 1 | - |
| c. Unable to inspect | 7 | 8 | 1 | 10 | 2 |
| Total | 100 | 240 | 109 | 178 | 197 |

# PART II

# REDESIGN AND SPECIFICATIONS

# CHAPTER III

## DEVELOPMENT OF NEW DESIGNS

### Information was Gathered

The design of a package requires knowledge from many areas. The previous section illustrated how the marketing area comes into play long before a new package design is started on the drawing board. Also, knowledge from many other areas must be obtained before a realistic approach can be made toward the design of a new package.

For the purpose of this research work, it was necessary to obtain information about the present packages which were determined inadequate. This was done by approaching three food packers in each of the five areas under study. These companies were told of the work that had been completed and asked for the following information:

1) What materials are being used in the present package?
2) What is the unit cost of the present package?
3) What is the filling cost of the present package?
4) What is the estimated length of storage of the present package?
5) What channel of distribution is used for the present package?
6) Could samples of the present package be supplied for purposes of this research?

An answer with complete information, as far as possible, was received from each of the companies approached. This information was regarded as "extremely confidential" and therefore will not be recorded in this study.

It might be added at this point that a company approached by this letter was one who had previously stated that it apparently had no

inadequate packages. After finding out that by a series of surveys these packages were not considered adequate, this company became very interested and their cooperation was certainly a great help. In other cases, companies who had not answered the original questionnaire became quite interested and their cooperation was also sincerely appreciated.

This information was gathered in order to design a package which would be "economically justified." Because of the low profit in the food industry, increasing packaging cost could certainly be detrimental. Therefore, gaining information in regard to material, unit, and filling line cost of the present packages is of great value. Also information regarding the expected shelf life and channel of distribution is necessary in order to be assured of proper protection for the product.

After the marketing and economic information had been gathered, the author started developing ideas for new designs. It should be mentioned that as new designs continue to be developed, the packaging designer will find that he will have to work in conjunction with--engineering, art, food technology, purchasing, production, advertising, sales, and again marketing. An attempt will be made to show where these different departments enter into the picture as the new designs are developed.

## Package for Dry Products

The cellophane bag for dry products such as rice, noodles, beans, macaroni, etc. was considered inadequate for many reasons. After studying these reasons, it was obvious that a package was needed that would be stronger, have better stacking ability, reduce leakage, and

be reclosable. A package which could satisfy these conditions would be the answer to the greatest number of complaints.

Steps have already been taken as shown by the more extensive use of polyethylene bags. These bags provide greater strength and reduce leakage because of greater bursting strength, greater tearing resistance, and better heat sealing properties. The polyethylene bag answers some of the problems, but by itself it still leaves much to be desired. The reclosing problem was eliminated by the addition of a sealing strip of aluminum foil-paper-polyethylene lamination. This strip, which was about two inches in width, was heat-sealed around the inside circumference of the bag near the top. The polyethylene surface of the foil strip was in contact with the bag so that upon the application of heat the two surfaces fused. The housewife could cut along the top of the aluminum strip in order to open the package. The bag is then easily reclosed by crimping the aluminum foil. This, of course, will prevent the product from spilling and will give the product better protection. This strip will also aid in dispensing free flowing dry products such as rice because the sag normally present in the unsupported pouring area will be eliminated.

The polyethylene bag has only recently become a competitor for cellophane. This has been made possible by the great amount of research work that has been done in developing this film. Today the cost of polyethylene compares very favorably with that of cellophane. In comparing the cost of the various films for this bag, it is found that the advantages offered by polyethylene are certainly economically justified. The following shows a comparison of the unit cost of these bags:[9]

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[9]"Cost Table: Papers-Films-Foils," Modern Packaging Encyclopedia, November, 1959, p. 137.

| Type | Cost per Unit |
|---|---|
| Moisture-proof heat-sealing (300) MS cellophane | .0089 |
| 1.5 mil. low density polyethylene | .0067 |
| 1.5 mil. low density polyethylene plus foil strip | .0091 |

To gain complete and accurate information on these materials the services of a purchasing department would be very important.

Another important consideration is that of forming, filling, and sealing the package. This work should be done in conjunction with the engineering and production departments. In regard to these packages, there is no problem in forming the bags. Both cellophane and polyethylene bags can be formed on existing machinery at a rate as high as 16,000 bags per hour. Because of the large use of these bags, filling and sealing equipment is also readily available. These packages could be printed by the letterpress, gravure, or flexography process depending upon the quality of the work desired.

The bag containing the foil strip would present an additional problem. This would involve the placing of the foil strip in the bag. A modification of the regular bag former would be necessary and the production cost would be increased. It would have to be determined if this additional cost was justified in respect to the advantages gained by a better package.

The bag, regardless of the material with which it is constructed, leaves a great deal to be desired. The problems this type of package creates on the retailers shelves and in the housewives cupboards still remain. These problems deal primarily with appearance and stacking

or storing ability. In answer to these problems, increasing amounts of folding cartons are being found on shelves previously occupied by bags.

Because of the great number of problems answered by this type of package, it was felt that it is the most adequate type of package for this area. Due to the economic considerations, the bags that have been previously mentioned are probably the most realistic answer for the present. However, in looking to the future, the design shown in Figures 4 and 9 are presented. This folding carton was designed with a pouring spout. The spout is self locking both in the open and closed position; so therefore answers the problem of pouring and closing. The rectangular rigid shape of this package adapts it to the shelf and makes good displays possible. The specifications for this package are shown in Table 10. Also a comparison of the different types of packages for this product can be seen in Table 9. This illustration shows which undesirable characteristics have been eliminated by each type of package.

It is almost impossible to estimate the cost of a folding carton in the laboratory because of the many variables effecting cost. It can be said, however, that folding cartons that can be set-up and filled on standard equipment are quite economical. This is true because of the relatively inexpensive materials and the tremendous speeds that can be realized if special provisions are not required. The box that has been designed can be set-up and filled on the existing standard equipment. The sealing process would be reversed so that the bottom would be sealed last. By doing this the top could be formed prior to the filling operation. This would involve modification of the existing equipment and relocation of the gluing rolls. By doing this, other more

TABLE 9

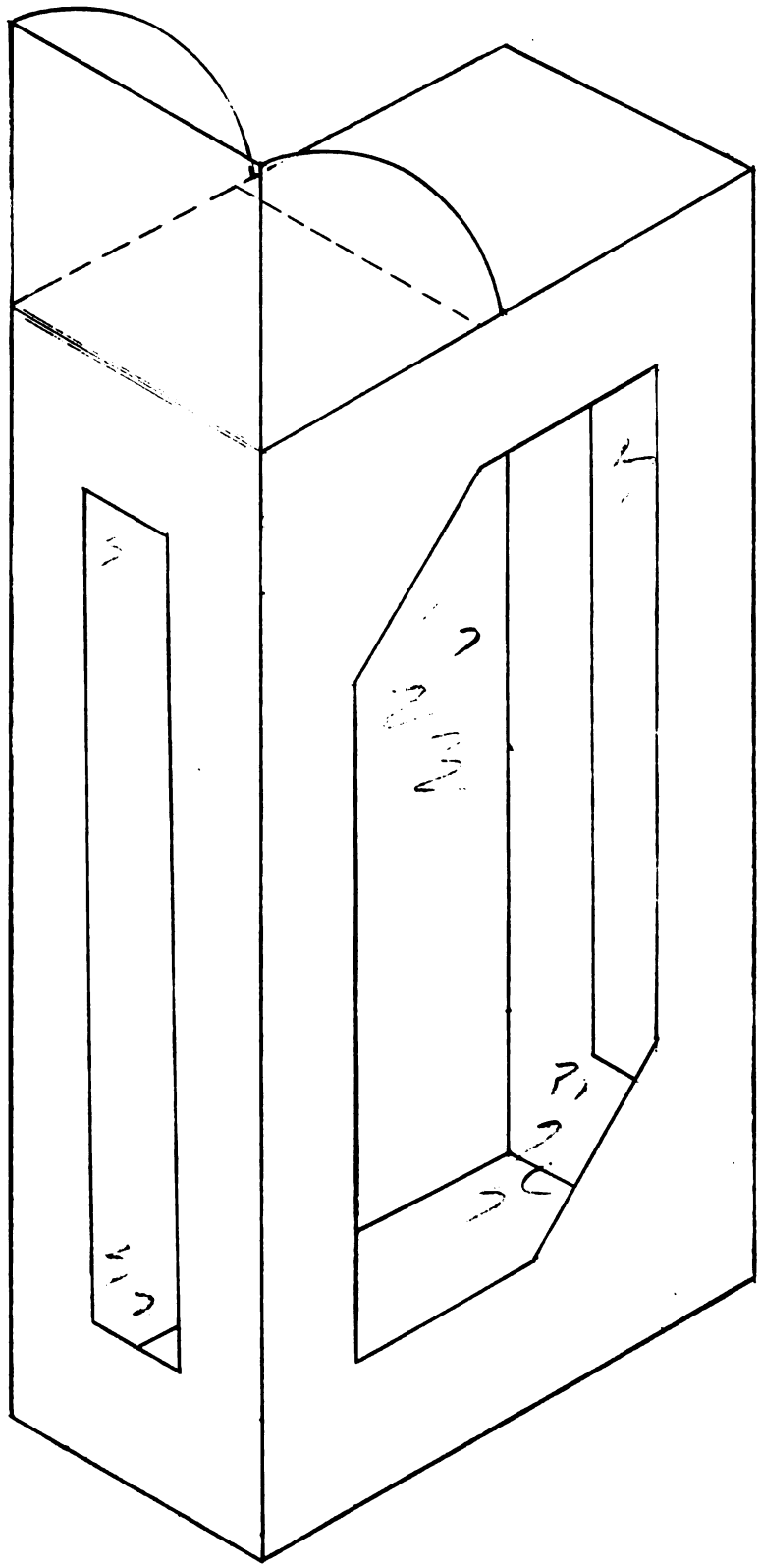
A COMPARISON OF THE INADEQUACIES OF THE VARIOUS DRY PRODUCT PACKAGES

| Characteristic | Polyethylene Bag | Polyethylene Bag with Foil | Folding Carton |
|---|---|---|---|
| Consumer | | | |
| Hard to store | | X | X |
| Hard to open | | | X |
| Hard to dispense | | | X |
| Hard to reclose | | X | X |
| Messy to handle | | | |
| Spills or sifts | X | X | X |
| Package Breaks | X | X | X |
| Retailer | | | |
| Hard to stack | | | X |
| Hard to mark price | | | X |
| Poor display ability | | | X |
| Package leaks | X | X | X |
| Packer | | | |
| Structural adequacy | X | X | X |

Note: 1) The cellophane bag was not listed as the characteristics given were all determined inadequate for this package by the survey.
2) "X" denotes inadequate characteristics which are removed.

FIGURE 4

THE PACKAGE FOR DRY PRODUCTS



serious problems would be eliminated because the package would be sealed in the conventional method after it had been filled. The cost of this container should compare favorably with the folding cartons which are being used today. In addition it offers many more benefits to the retailer and consumer.

## Package for Bacon

The bacon package has, for a long time, been the "sore thumb" in the meat packaging industry. There appears to be three main reasons for this inadequacy which are as follows:

1) The structure and design prevents good counter display and appeal.
2) The flat shape is not compatible with storage areas.
3) The package cannot be reclosed once it has been opened.

The recent trend has been to develop a reclosable package. These packages are a modified style of the folding carton, but retain the thin flat shape characteristic of the bacon package. After careful examination of these new packages, it appears as if very little has been accomplished. The flat shape does not allow for a flap which is large enough for proper reclosing. These flaps tend to break outside the score lines upon opening and become very hard to reclose. Because of this fact, it was decided that a new design should be started by changing the shape of the package.

It was discovered that by stacking the bacon one slice on top of the other that a very compact shape would result. A package was constructed to facilitate this shape and was found to contain many decided advantages which are as follows:

1) Attractive shape for displaying package.
2) Good surface area for graphic design.

3) Compact shape for easy storage by consumer and retailer.
4) Large flap to facilitate reclosing.

A problem existed as to how the lower slices of bacon could be removed. This was solved by stacking the bacon on a tray which could be pushed up through a hole in the bottom of the retaining container. See Figure 5.

This package was further refined in order to obtain a good reclosing flap. This was accomplished by developing a self-locking tab at the front of the top flap. By placing a finger under the corner of the top flap, this tab will disengage and easy opening is achieved. Also, the side flaps were developed to push the bacon back into the package after the desired amount had been removed.

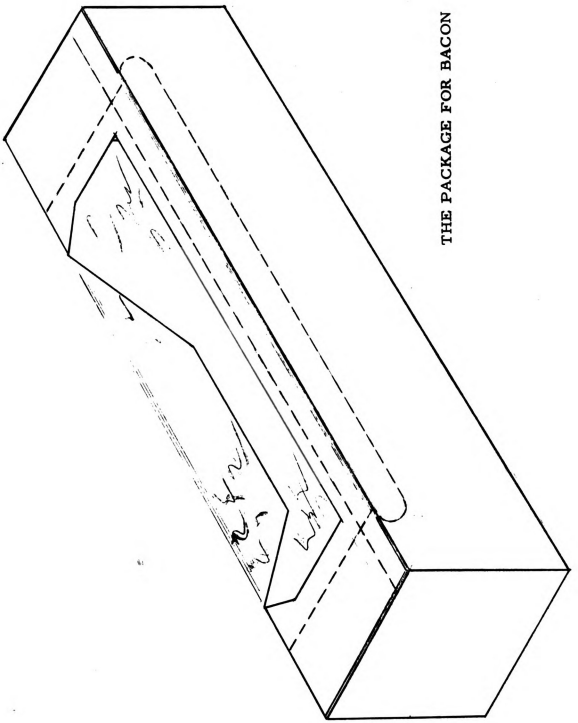
The design was completed by locating a window which would allow inspection of the bacon by the consumer. This window was placed on the top and part way down the back panel of the package. This would allow for exposure of the lean edge. The blank for this package is shown in Figure 10.

As was previously mentioned, the bacon would have to be stacked one piece on top of the other for this package. This would involve a modification of the bacon slicing equipment. Also, it is felt that the ends of the bacon should be sliced so that they would be even and the desired length for the package.

This package is made from the same materials as the package in use today. There is, however, eighteen percent less material in this package. This savings should easily absorb the cost of modifying the bacon slicing equipment. Specifications for this package can be seen in Table 11.

Another point of importance in regard to bacon is that of the slices sticking together. This can be partially eliminated by giving

FIGURE 5



THE PACKAGE FOR BACON

proper instructions on the package for the storage of the bacon. It should be placed in a position so that it will not freeze. The ultimate solution would be to separate the slices by use of paper dividers as is done with cheese and some other meat products.

A check of the list of inadequacies for the present bacon package will show that this new package solves most, if not all, of the problems. There is no apparent problem of spoilage with the present package. The design of the new package allows for a tighter reclosing so that the problem of spoilage should not arise.

## Package for Cereal

The cereal package in its present form is probably one of the oldest packages on the market. There have been minor changes in the reclosing of the top, but the big problem still remains. This problem involves the liner which has always been a nuisance to the housewife. The problems arising from this liner are as follows:

1) The liner must be opened for each use.
2) The liner does not allow even flow during dispensing.
3) The cereal falls between the liner and box.
4) The liner must be closed after each use.

The most logical answer would be to eliminate the liner. This is a solution that has been long sought after without much success. Because of the low profit in the cereal industry a laminated paperboard material, which would replace the liner, has been out of the question. Recently, in talking to the research director of a large cereal company, it was brought out that such a material may not be too far in the future. There is still, however, problems that must be overcome before this material can be put on the market. The marketing people feel that the consumer has associated this liner with protection and freshness.

These people feel that although the consumer may detest the liner that they may feel its elimination will also eliminate the freshness of the product. Only through the results of numerous marketing surveys will the answer to this question be found.

The primary inadequacies of the cereal box with a liner have been previously given. In working on a design for this package, it was felt that a side opening would help solve some of these problems. Figures 6 and 11 show the design which was considered to best answer these problems.

This package could be used on all of the existing set-up, filling, and sealing equipment without any costly modifications. The only small change would be the addition of a gluing roll at the station where the bag is inserted. The purpose of this would be to glue the bag to the side of the container in the area of the pouring hole. There would be no change in the nature of the materials used and the amount would increase only by extending the glue flap one and one-fourth of an inch. With these facts in mind, it appears as though this package would be economically justified. The specifications for this package can be seen in Table 12.

## Other Designs

The fact that the liner may be eliminated motivated work on an additional design. The container in Figures 7 and 8 is felt to have very good possibilities in the future. It is felt that the theory behind this design is probably more important than the design itself. This theory is that by using lighter weight boards and increasing the number of thicknesses of particular walls, that a greater number of built-in features will result. As can be seen with this package, a unique pour

FIGURE 6

THE PACKAGE FOR CEREAL

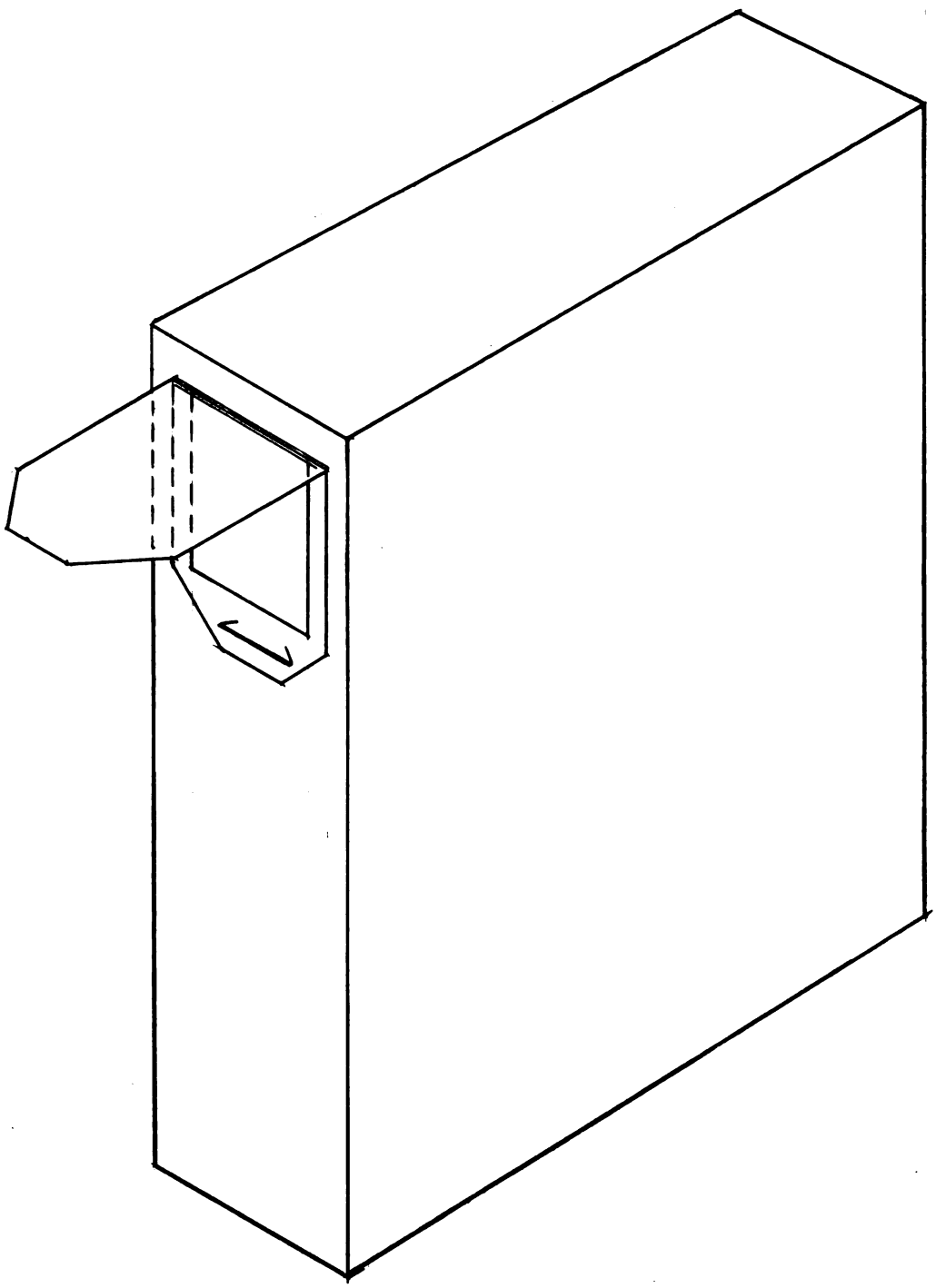
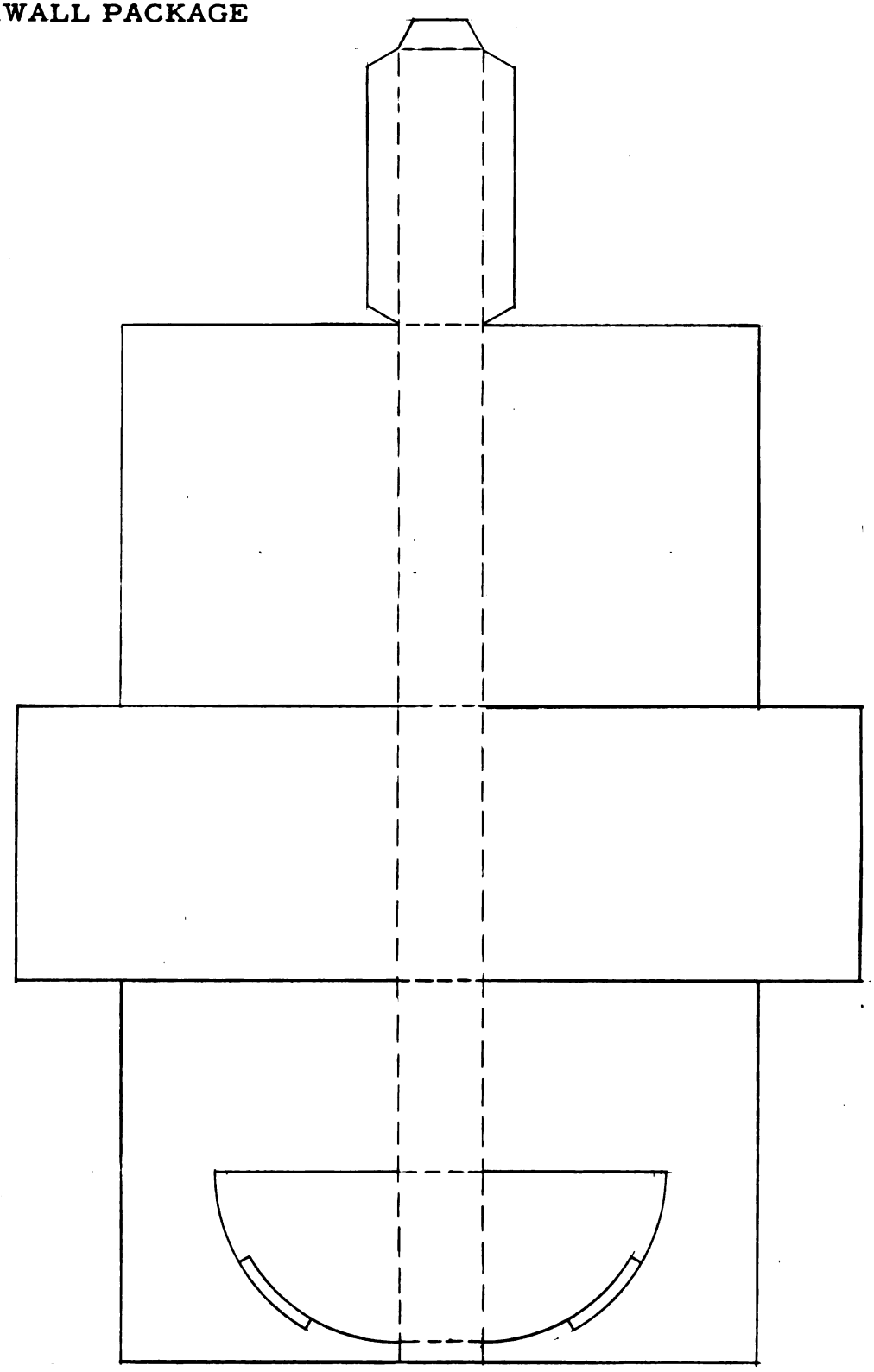


FIGURE 7

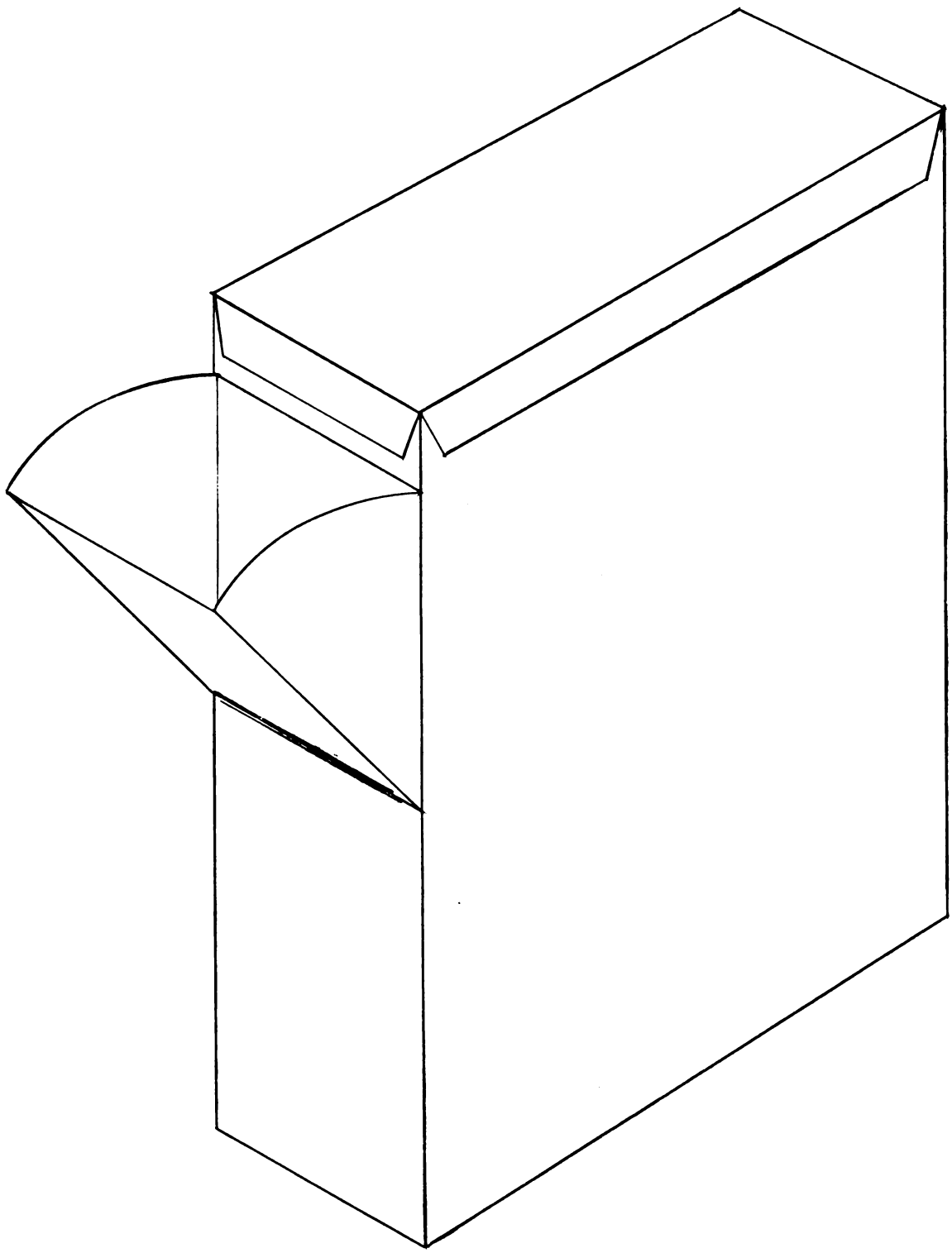
THE BLANK FOR THE
MULTIWALL PACKAGE



Dimensions omitted. For Illustrative Purposes Only.
Cereal Package Scale $\frac{1}{4}$" = 1".

FIGURE 8

THE MULTIWALL PACKAGE



spout has developed. This spout is guided between two layers of board and also has stops at the open and closed positions. Although it would be hard to economically justify this type of package at the present, the development of new materials and the increasing significance being placed upon the package may make it quite realistic in the future.

To complete this section, the author would like to say a few words about the two packages which have not been mentioned. These are the brown sugar box and the sugar-flour bag.

The brown sugar box was picked as inadequate primarily for one reason--the effect of moisture gain upon the product after the box had been opened. Research work has previously been done on this problem by a group of packaging students. It was discovered that by using an aluminum foil-paper lamination as a liner that this problem could be eliminated. This was possible because the aluminum foil made it possible, by crimping, to form an air tight reclosure. The glassine liner which is presently used does not make such a reclosure possible and upon folding it lost its protective properties. The author could see no reason to labor this point further.

In regard to the sugar-flour bag, a redesign with economic justification was in no way possible. The paper bags provide a very inexpensive package for these products. Because of the weight and sifting nature of the products, any new design utilizing another material would increase the cost of the package beyond reason.

An attempt was made to support these packages by a corrugated liner along the sides, top, and bottom of the bag. This was done in hopes of squaring the shape of the package so that it would have a better appearance and greater stacking ability. It was discovered, however,

that the weight of the product (ten pounds of sugar) would cause the liners to buckle in a direction parallel to the width of the bags. Therefore, it appeared that the only solution would be to change the style of the container to a fibre board box of sufficient strength to support the weight of the product. A comparison of the cost of such a container with that of the bag made this idea entirely out of the question.

The bursting strength of the bag could be increased by using the new stretchable kraft papers. However, the major problems of stacking, storing, and pouring would still remain.

# CHAPTER IV

# SPECIFICATIONS

## General Information

A good specification can not be looked upon as a tool for making money, but rather as a tool for saving money. It would be beyond reason to try to estimate the money lost in the packaging industry because of incomplete specifications. It has been said that from eighty-five to ninety percent of the specifications received by suppliers lack essential details.[10]

A specification must act as a liaison between the supplier and user. Therefore, it is essential for it to contain information regarding materials, filling lines, printing, product characteristics, design, and channels of distribution. Another problem that is encountered in regard to writing a proper specification is the lack of standardization by the packaging industry for testing methods. Because of this, the specification for a particular material or package is valid only in respect to the testing methods used. Under a different set of methods, an entirely different specification may be written.[11]

The specifications that appear in this paper will be primarily concerned with folding cartons. However, specifications regarding

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[10]Clemens Koehler, "Maintain Proper Packaging Specifications," New Techniques for the Packaging Engineer (New York: Packaging Institute, 1954), p. 3.

[11]"Packaging Specifications," (New York: Container Laboratories, Inc.), p. 2.

different types of packages and materials should contain the same basic information and would differ only in respect to their unique characteristics.

In writing a specification, the first aspect to be considered is the nature of the product. This will allow for proper materials to be selected which will offer adequate protection to the product. It will also protect against a material being used which might react with the product being packaged. This should include information regarding the weight, size, chemical composition, and consistency of the product.

Next a description of the materials used for each component of the package is needed. This should contain information regarding bursting strength, stiffness, grade, rigidity, weight, caliber, finish, brightness, printability, absorbency, and special treatments.

A description of the type of package being used should be supported by accurate drawings. This should contain information regarding dimensions; tolerances; scores; glue areas; special features such as cutouts, windows, perforations, pour spouts, etc.; grain direction; pre-broken scores; and side seam gluing.

A diagram of the graphic layout should give accurate descriptions of the colors to be used. The method of printing should also be specified. Care should be exercised in the specification of the inks used. Problems can arise because of product-ink reaction or friction caused by certain inks on the filling line.

Automation has caused serious problems which are non-existent in hand filling techniques. The tremendous speeds realized today call for extremely uniform and accurate packages. Therefore, a description of the machinery and speeds used is of the utmost

importance. Because of these speeds tolerances of one thousandth of an inch have been required in die cutting layouts. This information should include details as to the method of opening, method of closing, method and type of gluing, method of filling, method of packaging filled carton for shipment, the quantity desired, and the delivery date required.

Finally, information should be given concerning the channel of distribution. This will help the supplier to realize the conditions the package will encounter and also to see the ultimate purpose of the package.

By spelling out the preceding information in detail at the beginning, the user can eliminate much guess work, possible embarrassment, and error. In all probability, the item which goes into the package has a very meticulous set of specifications. Why then should not the specifications for the package be given the same treatment?

The following specifications have been written with the preceding information in mind. The following pages contain the drawings and charts which make-up the specifications for the three redesigned packages. It is felt that these specifications are complete and lack in information only to the extent that advice and knowledge from people in the many related areas was not readily accessible.

Specifications for the Dry Products Package

TABLE 10

SPECIFICATIONS FOR THE DRY PRODUCT PACKAGE

PRODUCT:

Name: Rice Size: Small grains

Weight: 2 pounds per package (net weight)

Consistency: Free flowing solid

Nature: Hygroscopic. May swell in extreme moist conditions. No reaction with paper board.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

MATERIALS:

Carton: Solid bleached sulphate

Bursting Strength: 100 psi Stiffness: MD 50-CD350 (Taber)

Grade: A Weight: 85 lb./1000 sq. ft.

Caliper: .020 Finish: #1

Absorbency: Water absorption - 2½ minutes

Special Treatment: None

Window: Polystyrene

Thickness: .0015 Tensile strength: 9,500 lb./sq. in.

Elongation: 15% Specific gravity: 1.05

Bursting strength: 40 lb./sq. in.

Tearing strength: 35 gm/mil.

Water/vapor permeability: 4.4 gm/24 hr./100 sq. in. 100° F., 90% R. H.

Continued

TABLE 10 -- Continued

PACKAGE:

Style: Folding Carton — Drawing No. 193 (attached)

Length: 3 3/4 in. — Width: 2 in.

Depth: 7½ in. — Volume: 56.25 cu. in.

Panel overlap: 5/8 in. — Closures: Glue (borated dextrin)

PRINTING:

Illustration: — Type: Rotogravure

Color: (specify by code no.) — Inks: Alcohol base

PRODUCTION:

Cartons will be set-up, filled, sealed, and packed for shipment on automatic equipment at a rate of 400 per hour.

Number of cartons required per shipment: 32,000

Dates required: July 1 and every two weeks thereafter.

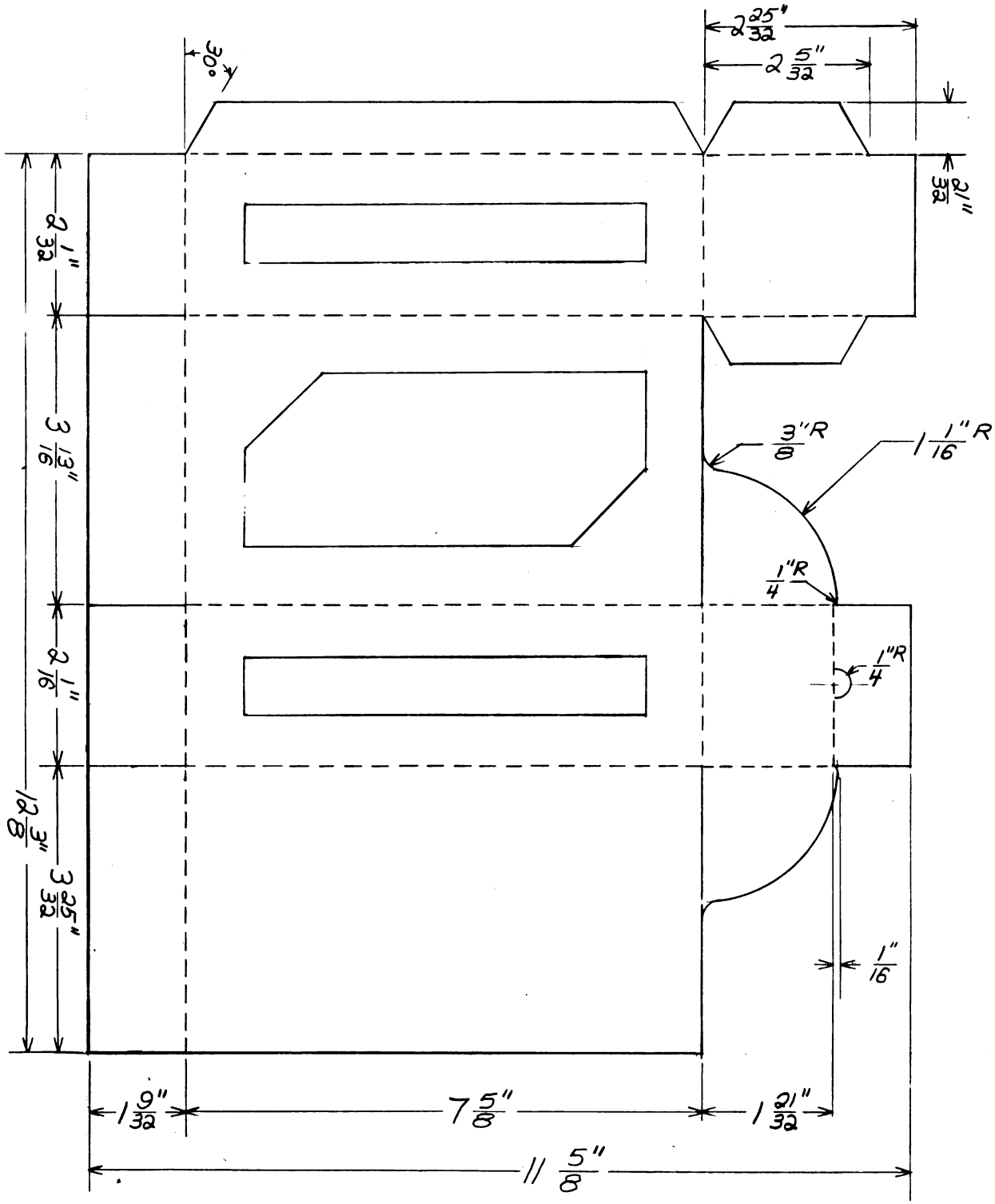
DISTRIBUTION:

These packages will be distributed by the wholesaler-retailer-consumer channel. Package must be attractive to motivate buying. Estimated shelf life is 60 days.

Note: All tests to comply with standards in Appendixes I and II.

FIGURE 9

BLANK FOR THE PACKAGE FOR DRY PRODUCTS




Drawing No. 193

6-30-60 Barnes

Specifications for the Bacon Package

TABLE 11

SPECIFICATIONS FOR THE BACON PACKAGE

PRODUCT:

Name: Bacon (meat) Size: Thin slice ( 9x1 3/4 in.)

Weight: 1 pound per package (net weight)

Consistency: Fatty solid

Nature: Smoked pork. Greasy. Requires refrigeration.

MATERIALS:

Carton and tray: Solid bleached sulphate

Bursting Strength: 90 psi Stiffness: MD 45 CD240 (Taber)

Grade: A Weight: 72 lb./100 sq. ft.

Caliper: .016 Finish: #2

Absorbency: Water absorption - $2\frac{1}{2}$ minutes

Special Treatments: Wax coated

Surface wax per ream*

| | |
|---|---|
| Total | 12 lb. ± 1 lb. |
| Minimum per side | 5 lb. |
| Maximum difference | 1.5 lb. |
| Moisture Content | 6% ± 1% |
| Gloss | 55% photovolt |
| Opacity | 58% photovolt |
| Brightness | 75% photovolt |

*3,000 sq. ft. per ream.

Continued

TABLE 11 -- Continued

Window: Polystyrene

Thickness: .001 in. Tensile strength: 9,000 lb./sq. in.

Elongation: 15% Specific gravity: 1.05

Bursting strength: 35 lb./sq. in.

Tearing strength: 25 gm./mil.

Water/vapor permeability: 4.4 gm./24 hr./100 sq. in. 100° F., 90% R.H.

PACKAGE:

Style: Folding carton Drawing no. 194 (attached)

Length: 9 in. Width: 1 3/4 in.

Depth: 2½ in. Volume: 38.375 cu. in.

Panel overlap: 1 3/4 in. Closures: Glue (resin emulsion)

PRINTING:

Illustration No. Type: Rotogravure

Colors: (Specify by code no.) Inks: Alcohol base

PRODUCTION:

Cartons will be set-up and bottom sealed automatically. Bacon will be sliced and placed on trays automatically. Trays will be put into carton by hand. They will also be closed and placed in shipping container by hand.

Number of cartons required per shipment: 16,000

Dates required: July 1 and every month thereafter.

Continued

TABLE 11 -- Continued

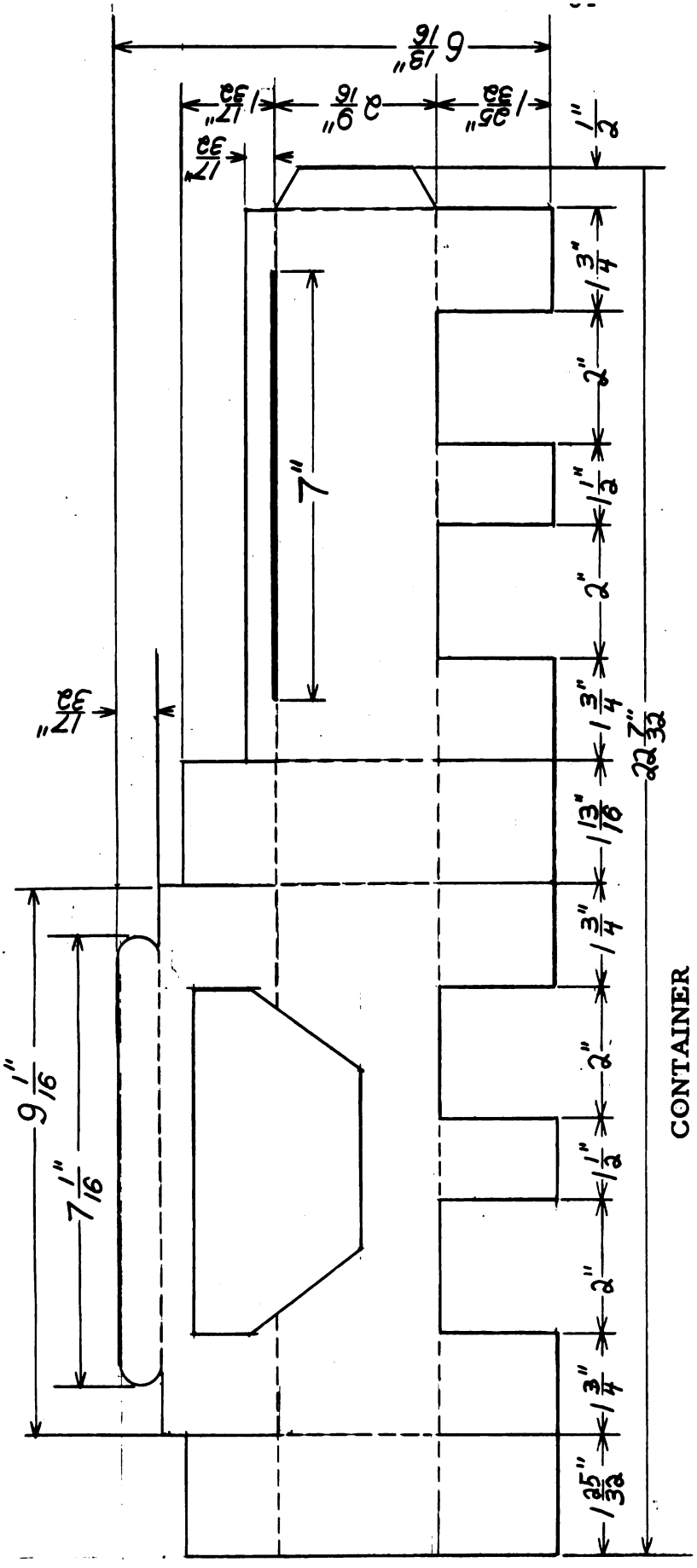
DISTRIBUTION:

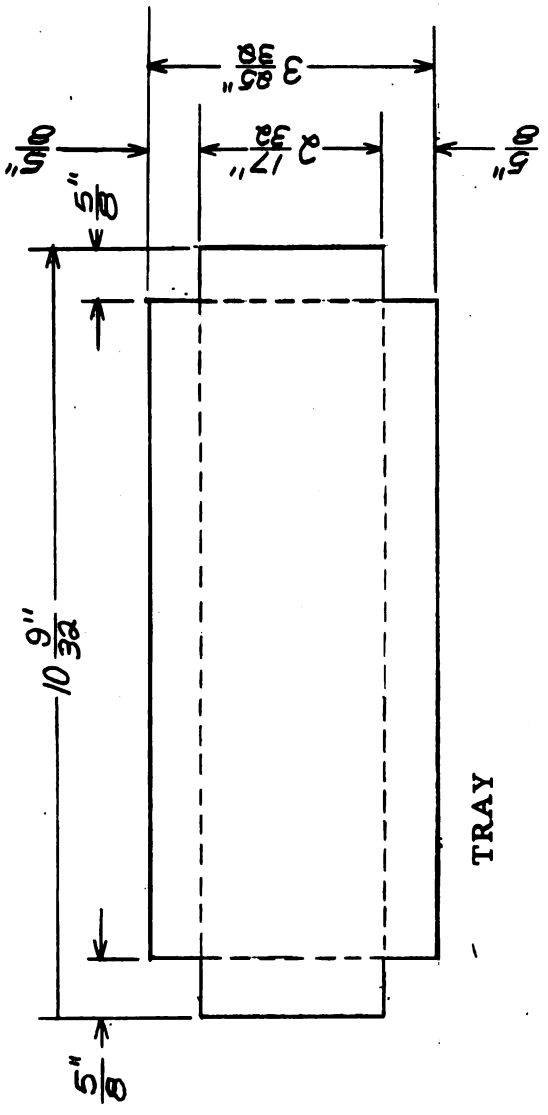
These packages will be distributed by the wholesaler-retailer-consumer channel. Package must be attractive to motivate buying. Estimated shelf life is 16 days.

Note: All test to comply with standards in Appendixes I and II.

FIGURE 10

BLANK FOR THE PACKAGE FOR BACON




Drawing No. 194

6-30-60 Barnes

Specifications for the Cereal Package

TABLE 12

SPECIFICATIONS FOR THE CEREAL PACKAGE

PRODUCT:

Name: Cereal Size: Flakes (medium)

Weight: 312 grams per-package (net weight)

Consistency: Free flowing solid

Nature: Very hygroscopic. Must maintain 3% moisture content. Principal ingredients are wheat, sweetening, salt, malt flavoring, and vitamin $B_1$.

MATERIALS:

Carton: Special bending chip

Bursting Strength: 100 psi Stiffness: MD 35 CD 220 (Taber)

Grade: B Weight: 70 lb./1000 sq. ft.

Caliper: .018 Finish: #2

Absorbency: Water absorption - 1 1/4 minutes

Special Treatments: None

Liner: Waxed Glassine

Bursting Strength: 25 psi Thickness: .002

Raw Weight: 28 Waxed Weight: 36

Tearing Strength: 25 gm/mil. Water/Vapor Permeability: 0.3 gm./24 hr./100 sq. in. at 100° F., 90% R.H.

Roll width: 26½ in. Cut-off: 10 3/16 in. Roll Dia.: 18 in.

Area/pkg.: 267.407 sq. in. Core inside dia.: 3 in.

Continued

TABLE 12 -- Continued

PACKAGE:

Style: Glued shell | Drawing no. 195 (attached)

Length: 7½ in. | Width: 2 1/8 in.

Volume: 154.38 cu. in. | Depth: 10 in.

Panel Overlap: 2 1/8 in. | Closures: Glue (borated dextrin)

PRINTING:

Illustration no. | Type: Rotogravure

Colors: (specify by code no.) | Inks: Alcohol base

PRODUCTION:

These cartons will be used on a pneumatic M. & F. line with gravity filler at a rate of 300 cartons per hour. Cartons automatically set-up, filled, and sealed. Borated dextrin adhesives used for all seals. Cartons put in shipping containers by automatic casers.

Number of cartons required per shipment: 30,000

Dates required: July 1 and every week thereafter.

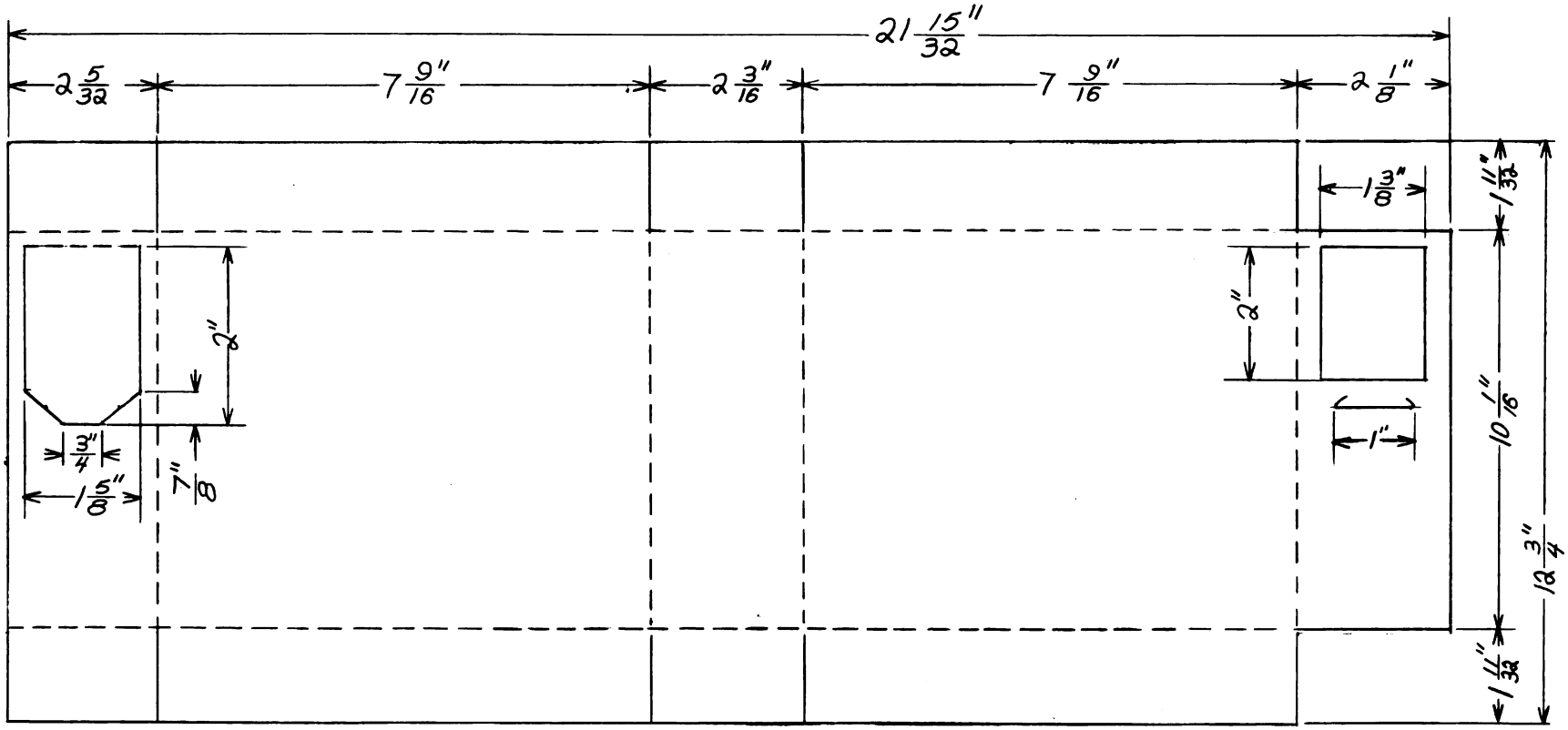
DISTRIBUTION:

These packages will be distributed by the wholesaler-retailer-consumer channel. Package must be attractive to motivate buying. Estimated shelf life is two months.

Note: All tests to comply with standards in Appendixes I and II.

FIGURE 11

BLANK FOR THE PACKAGE FOR CEREAL




Drawing No. 195 6-30-60 Barnes

# CHAPTER V

## CONCLUSIONS

In conclusion, the author would like to make some final comments on areas which were not covered in the development of these new packages. The first aspect deals with the testing of the finished packages. This involves physical, chemical, and consumer acceptance testing.

It is fully realized that in industry tests would have to be conducted on a great many finished packages. This would require a pilot plant so that a large number of packages could be produced, filled, and sealed under actual operating conditions. These packages and their shipping containers could then be tested in accordance with the testing methods set forth in appendix II.

Area sampling, one of the many techniques used today in marketing research, could be utilized to test for consumer acceptance. This process involves the placing of the new package in stores in a particular section of the country. The volume of sales is closely watched and evaluated in relation to past records. This information is often supported by questionnaires which have been filled out by the consumer. From this information, a decision is reached as to the future possibilities of this package on a nation-wide basis.

Another area which was justifiably omitted was that of the graphic designs for the new packages. This requires a great deal of talent and specialization to which the author makes no claim. It is felt, however, that American packages have lost all traces of aesthetic value. This does not imply that our store shelves and cupboards should become

art gallaries, but neither should they have the atmosphere of a circus. The author feels that our designers would do well to examine European packages and possibly follow the example of their European counterparts so that a little dignity would return to our packages. A package with subtlely colored geometric figures void of pictures of clowns, half nude athletes, or sweepstake prizes would certainly be refreshing on our cluttered supermarket shelves.

With these additional points in mind, it is felt that a thorough approach has been made to the problem assigned. This approach is outlined in Figure 12. This shows the steps that should be taken in the development of a new package and the relationship of the various departments at each step.

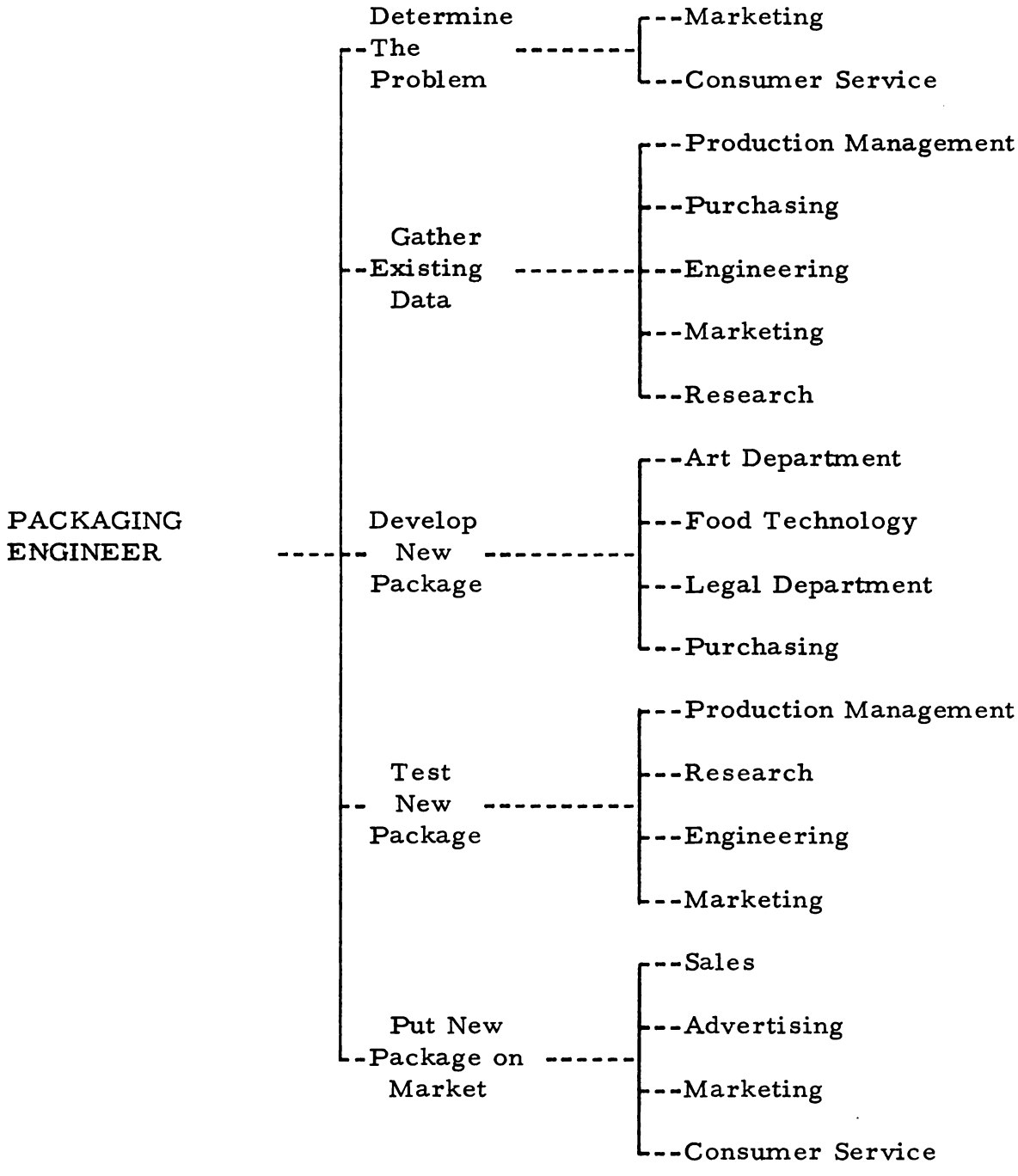
The packages that have been redesigned for bacon, cereal, and dry products have eliminated the greatest number of inadequacies that were brought out by the surveys. The following figures show the percentage of inadequacies that have been eliminated based upon the totals taken from Table 4.

| Product | Total Points | Points Eliminated | Percent Eliminated |
|---|---|---|---|
| Bacon | 123 | 105 | 85% |
| Cereal | 193 | 148 | 76% |
| Dry goods | 262 | 242 | 92% |

As was previously brought out, these redesigns were developed with an eye on economy. Therefore, it is felt that in consideration of the added advantages and the economic justification that these packages are more adequate than the present ones in existence today. In this same light, it is felt that these packages may be the inadequate packages of tomorrow so that continued research must go on.

FIGURE 12

RELATIONSHIP OF VARIOUS DEPARTMENTS IN THE DEVELOPMENT OF A NEW PACKAGE DESIGN



# LIST OF REFERENCES

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# APPENDIXES

# APPENDIX I

## STANDARD TESTS FOR PACKAGING MATERIALS

| PROPERTIES | ASTM | P.I. | TAPPI |
|---|---|---|---|
| Basis weight of paper and paper products | D 646-50 | 3t-49 | T410 m-45 |
| Brightness | D 985-50 | 12t-50 | T452 m-48 |
| Gloss | D1222-52T | 11t-50 | T424 m-52 |
| Opacity | D 589-44 | 13t-50 | T425 m-44 |
| Paraffin | D 590-42 | 31t-50 | T405 m-45 |
| Thickness and density | D 645-58T | 4t-49 | T411 m-44 |
| Bending quality | | 19t-50 | T474 m-47 |
| Bursting strength | D 774-46 | 6t-49 | T403 m-53 |
| Folding endurance | D 643-43 | 16t-50 | T423 m-50 |
| Internal tearing resistance | D 689-44 | 7t-49 | T414 m-49 |
| Moldability | D 920-49 | 27t-50 | T446 m-48 |
| Puncture, rigidity, stiffness, softness of paper, paperboard | | 10t-49 | T451 m-45 |
| Tensile breaking strength of paper and paperboard | D 828-48 | 8t-49 | T402 m-49 |
| Testing conditions | D 685-44 | 2t-49 | T402 m-49 |
| Grease resistance (Turp. test) | D 722-45 | 26t-50 | T454 m-44 |
| Insect resistance of packages, paper, paperboard | | | T473 m-47 |
| Water resistance of paper, paperboard (Dry indicator method) | D 779-58 | 20t-50 | T433 m-44 |
| Water-vapor permeability of paper and paperboard | E 96-53T | | T448 m-49 |
| Water-vapor permeability of sheet materials at high temperature and humidity | E 96-53T | | T464 m-45 |
| Water-vapor permeability of sheet materials at 0 deg. F. | | | T482 m-52 |

Note: This information was taken from the MODERN PACKAGING ENCYCLOPEDIA, (Issue 1960).

# APPENDIX II

## STANDARD TESTS FOR PACKAGES

| PROPERTIES | ASTM | P.I. | TAPPI |
|---|---|---|---|
| Adhesiveness of seals, closures | | | T806 sm-46 |
| Compression test | D 642 | 5t-53 | T804 m-45 |
| Drop test | D 775-57T | 4t-53 | T802 m-44 |
| Drum test | D 782-47 | 2t-53 | T800 m-50 |
| Incline impact test | D 880-50 | 3t-53 | T801 sm-44 |
| Puncture, stiffness of paperboard, corrugated and solid fibreboard | D 781-44T | 7t-53 | T803 m-50 |
| Vibration | D 999-48T | 6t-53 | |
| Water resistance of containers by spray method | D 951-51 | | T805 m-55 |
| Water-vapor permeability of packages | D 895-51 | | |
| Water-vapor permeability of shipping containers | D1008-51 | | |
| Printing | | | |
| Effect of alkali | | 1t-54 | |
| Dry rub resistance | | 4t-54 | |
| Fade-ometer | | 2t-54 | |
| Resistance to fats and oils | | 3p-54 | |

Note: This information was taken from the MODERN PACKAGING ENCYCLOPEDIA, (Issue 1960).