# Selection of Optimized Packaging Materials

N. McHUGH, Colgate-Palmolive Co., New York, NY

## ABSTRACT

Critical parameters in selecting the most appropriate packaging for soap and detergent products are reviewed. Included among these parameters are package strategy, features required for consumer utilization, competitive products, cost limitations, availability of materials having adequate chemical resistance to product, overall dimensions and construction details, machinability of selected design, pallet pattern or shipping configuration, physical strength of individual package and outer case, ability to withstand storage and handling rigors. Guidelines and criticality tests are reviewed briefly as tools for evaluating and projecting the effect of a given parameter on acceptability of the finished package.

## SELECTION OF OPTIMIZED PACKAGES

In order to optimize selection of packaging materials, it is absolutely necessary to use a systematic approach for arriving at the best compromise. Frequent referral to check lists and other screening devices allows recognition of problems and pitfalls that otherwise limit a brand's success while adding to costs.

It must also be recognized that, as development of a package proceeds, the amount of information needed to assess it, and the cost in time and dollars, escalate rapidly. Proper utilization and conservation of a company's resources dictate that an organized approach be used to generate packages meeting objectives. Consequently, a logical and on-going system is needed to evaluate viability of the developing package.

This report briefly covers one such system by tracking various phases of development used for optimization. No matter what procedure is used, success will depend on how diligently the various responsible people communicate and use value analysis in selecting options.

In a company that markets consumer goods, packaging is a marketing support function. It provides ideas, guidance and advice to marketing on design and construction of packages. It is responsible for translation of marketing objectives into effective packaging that is executed in a timely and economical manner. Many other facets and responsibilities are encompassed within the scope of packaging, but they are not germane to this presentation.

When analyzing the evolution of a package, one can split it into concept development, aesthetic design, functional evaluation, scale-up and refinement, and full production. Most of these five phases are not really distinct, nor do they occur successively. In fact, some of them occur simultaneously. Chances for development of a successful package will be increased if recognition of all phases is kept in mind throughout the evolutionary process.

Input for package concept development originates primarily outside the Packaging Department. As pointed out earlier, packaging is a service arm of marketing. As such, major portions of input for conceptual development come from them in three forms: (a) creative concepts—assembled by marketing from advertising agency input, synectics groups, other sources both in and outside the company; (b) need for package improvement—can be initiated by pressure from competitive products, governmental regulations or consumer dissatisfaction; (c) economic requirement—generated by need for increase in marginal income of product, competitive influences or preservation and survival of an established franchise.

These three sources of input become the basis for development of package concepts. The form this information takes can be categorized according to the subsequent heading.

### Product Description and Characteristics

This information identifies category or product and any significant properties which would dictate specific design or construction. For example, the concept may involve a pearlescent conditioning shampoo package which provides a unique dispensing system. Candidate packages that meet this concept require a product with certain properties to give acceptable performance, i.e., will viscosity allow easy dispensing? Does product tend to entrap air and foam during filling, thus dictating an opaque container since cosmetic fill is not feasible? Is it light-stable? Does it have a propensity to absorb oxygen from the head space in a container?

### Size(s) of Package Required

Volume or weight of package contents is indicated. An example is a 64-ounce heavy-duty liquid laundry detergent.

### Selling Price

Anticipated retail shelf price of the package is determined. An example is $1.49 for a 9-ounce tube of toothpaste.

### Market Segment

An outline is made of the proportion of consumers toward which the product is being targeted. For example, women 25-49 years old with middle/upper middle income constitute one consumer group.

### Timing

Timing data tell when a package is needed for sales testing. A district sales test may be scheduled for September 1981, for instance.

### Product Attributes

Here, the performance or unique properties that a product contains are described, i.e., how it is superior or different from other products in a given category. It is important to note that product attribute(s) determines package strategy, which will be explained in subsequent paragraphs. "No-inerts," e.g., is a concentrated, heavy-duty powdered laundry detergent.

### Form/Function

Form/function information identifies specific package design or construction to accomplish a desired result. For example, a powdered laundry detergent in a clear bottle may facilitate ease of measuring and pouring the product. A word of caution is offered for this form/function parameter—form must follow function. This is called the 3F rule. Failure to adhere to this rule in developing a package will result in a "gimmick" container. In almost all instances, gimmicks are doomed to failure.

### Packaging Strategy

This is the platform on which visual package image is built. It is derived from marketing concept and product attributes. The packaging strategy differs from the marketing or product concept in that it must quickly state only the main thrust of the concept, not all points, both major and minor. The strategy must be short, concise and translatable into visual graphics because of the compressed time and environment within which the package has to convey the message. Failure to concentrate on the main conceptual point of difference will result in a dilution of concept by cluttering up the limited sales area of the package with information of secondary importance. The packaging strategy answers the question, "What are the features the package must sell to consumers?" One answer could be to create a startling shelf image for a powdered, concentrated detergent by designing a package which shows the product, provides convenient handling and dispensing, and includes a measuring device to reinforce the concentrated formulation.

The next phase in the evolution of a package is the aesthetic design. This occurs formally or informally through the use of checklists to insure inclusion of appropriate elements into the package. It is the stage which allows the designer freedom to impart character to the package. There are a number of parameters to be addressed at this point.

The material of construction defines what material(s) will be used to make a given package, e.g., a high density polyethylene bottle.

The process in packaging involves answering a number of questions which will dictate a certain design. A plastic bottle design will illustrate the point: is it acceptable to have visible outage in bottle? Where/what part of the store shelf is the product normally displayed? If dispensing is a requirement, can it be accomplished within existing constraints and processes? Or will this bottle need an experimental manufacturing process and thus dictate a timetable that is too long to meet due dates? Can the design be labeled on existing lines? Will modification of lines to label the proposed package be required? If so, and timing is tight, are outside sites available for label application?

Competition requires collecting samples, photos and data on what competitive packages look like, i.e., what the features are that differentiate them from others in category, and what main points the label addresses?

For legal requirements, a review must be made of regulatory stimulations that will affect design. For example, the generic name of the product must be displayed parallel to the base of the container or at an angle no greater than 20° from the horizontal.

Consumer convenience covers analysis in which a special feature, such as a measuring cap, is required to make usage easier for consumers. A mouthwash cap must also be available for use as measuring device, for instance. Packaging must answer questions such as, "Will the cap require a liner for proper closure? If so, will the presence of a liner create complaints because it gets thoroughly wetted, becomes dislodged and falls out during subsequent use by the customer?" The answers to these queries may dictate a linerless cap of special construction with appropriate markings for measuring ease.

The third stage of package evolution is functional evaluation. This is the point at which package engineers assess a proposed design versus a list of criteria that will determine commercial feasibility. The designer, in quest of achieving distinctive, eye-catching packaging, is forced to develop items which differ from the norm. Unfortunately, this may result in constructions that are difficult to manufacture, fill or handle. Therefore, the engineer prepares a checklist to uncover potential shortcomings of the proposed design. Once again, a plastic bottle design is selected to illustrate this segment. Items that are included on the checklist are described in the following paragraphs.

Processing ability screens questions such as: does design lend itself to available blow-molding processes? Does the neck finish require injection blow molding because of complexities and tolerances? If a handle is included, is it so designed to require an extra large parison? Will cutting and trimming around the handle be restricted by the proposed design? Are all elements functional or have they been included for appearance only? If so, will this add to the cost and increase the difficulty in blowing? Is parison control required for uniformity in distribution of plastic? Is it available from the supplier under consideration? What about the ratio of width to depth of the proposed bottle? Parison diameter is directly proportional to the front-to-back (depth) dimension of bottle. Does the design require an abnormal blow ratio (above 3-to-1 bottle-to-parison diameter ratio)? If so, the economics of cycle time, output and mold size can be negatively affected.

Strength addresses the design to determine if the bottle will be weak in compression or if it will create stress points, weak spots and thus potential cracking and leakage problems. Experience has shown that the vertical or top-to-bottom compression strength for plastic bottles should be a 30-lb minimum. Improperly designed shoulders or horizontal grooves can drastically lessen the vertical strength. In addition, sharp corners, handle configurations, or deep design indentations can set up stress points which may crack and cause damage.

Machineability involves assessing the design to determine if it will cause inefficiencies to occur. One such example would be a proposed label area that is intended to give the maximal space to print graphics and copy. This may require a label that is large and exposed to damage via scuffing abrasion. Also, the label area must be examined for compound curves. The presence of these will cause difficulty in application and wrinkling of the label in production.

Filling and handling requires a review of the desired geometry to eliminate or minimize features which can cause filling, conveying, case packing or palletizing difficulties. Examples are: a restricted area near the neck of the bottle which could cause reduced filling rates or an excess foaming of the product; the designer dictates a tall, thin bottle, rounded quite severely, which is unstable on production lines and can cause damage due to pallet overhang. One should ask, "Would a minor revision in width or depth of the container eliminate the overhang of cases on a pallet?" One of the greatest sources of damage to packages is due to overhang/underhang of cases on pallets during stacking in warehouses and in transit to stores.

Cost: careful review of design geometry, such as already mentioned, could uncover potential upcharges. Minor functional changes may be possible to eliminate these.

Timing: the key question here involves the ability to meet consumer and sales testing schedules with the proposed construction. A lack of proven bottle blowing, filling, or labeling equipment might preclude meeting the deadlines. This must be determined and the schedule changed or the design revised to accomodate timing.

The fourth phase in package evolution is the scale-up or reduction to practice via fabrication of tooling for a limited market test. At this juncture, the indicated changes are made based on results from the functional evaluation studies already mentioned. Naturally, there are key criteria to be measured including those described in the next section.

*Machine revisions.* This applies to that part of the package development process in which blueprints and models are supplied to production management for its assessment of the need to plan for machine changes. At this time, actual package components may not yet be available. However, lead times for equipment parts are long and must be ordered several months in advance of production.

*Tool development.* Involved is the fabrication of a unit mold, die, or plate from blueprints already developed. The completion of unit tools will provide the first commercial samples of a given package.

*Sample evaluation.* This consists of testing the samples produced in the unit tools already described. Based on the outcome of test results, either permission is granted to make the full production tool sets or revisions in the unit tool are required. If revisions are required, resampling must be done when the revisions are completed.

*Target standards.* Once samples from the unit tool have been approved, target standards are then established for the package. The targets usually have been modified somewhat from what was originally anticipated and now represent realistic, achievable standards.

*Specifications.* These are established based on the actual measurement of samples from approved unit tools.

*Market test.* This is a very limited test (usually a consumer test) of several hundred to a few thousand packages to evaluate customer acceptance. This allows changes in marketing strategy and other revisions, if results of the limited test so indicate.

The fifth stage of package evolution is the production phase. It is at this point that many people are involved and considerable funds have been committed. The production stage can be divided into at least four parts, as described next.

*Start-up.* This refers to the production start both at the supplier and your own company plant. It is the first real opportunity to evaluate materials made under production conditions. Very minor adjustments can be made in package and equipment components, if needed to meet specifications.

*First run evaluation.* Packages from the initial production are evaluated, with and without product, to ensure that start-up specifications are being maintained. Evaluation is made in the field, as well as the lab, to observe how the package performs in the warehousing, shipping and sales environments.

*Quality tolerances.* Package material quality tolerances are established based on the target specifications and industry's acceptable variations. In the case of printed materials, the process and state of the art dictate the range of acceptable light-to-dark deviation from target color. The range is established usually on the basis of visual observation. Package materials, such as substrate coating or surface treatment, must be within the original established specifications after treatment.

*Maintenance.* Involved are (a) ongoing package revisions for deals and promotional activity, but more importantly, (b) functional analyses and improvements to keep a brand viable throughout its life. At least five important activities are constantly addressed, including: maintaining self-image and esthetics with design and construction changes; improving the strength of package components to offset changes in, e.g., plant equipment and distribution chains that can negatively affect selling ability; pursuing the upgrading of supplier processing to achieve a more uniform quality; analyzing samples to determine if added protection is needed to maintain package acceptability to customers; developing improved constructions which require little or no production-line revisions.

Success in brand maintenance requires care and attention to the constantly changing conditions in which the package must survive. There is no substitute for vigilance to prevent diminution of package quality on store shelves.

Selection of optimized packages requires a logical development program which addresses critical factors in each phase of the evolutionary process. Of absolute necessity is an integrated system of checks and balances among the different disciplines responsible for the package. The key is optimization via compromises that retain unique features, but do so within existing constraints of equipment and feasible technology. Package development, like formulation work, requires constant attention.