Designing Packaging For The Environment — Part II

How effectively we meet the challenges of designing environmentally friendly packaging will determine the future quality of life.

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Editor's Note: Topics covered in Part I in March included an historical perspective on packaging, material selection, source reduction, regulation compliance and new packaging development areas. Part II continues the discussion of designing packaging for the environment, starting with reusable shipping containers.

Today, reusable shipping containers have become a familiar and important step in distribution packaging. The containers with hinged or snap covers are fabricated from high-impact plastic, come in a variety of sizes and specifications and can pay for themselves again and again through hundreds of return trips. This eliminates the effects of years of employing disposable packaging, including corrugated one-time use cases, shrink film for overwrap, various plastic stripping to secure the load and corrugated partitions to stabilize loads above a certain height.

Reusable plastic bins, because of their configurations, fit snugly when stacked and also securely seal containers when high-priced products are shipped. The containers are highly durable, have excellent impact resistance, and provide increased protection while reducing scrap loss by inefficient handling, transportation and storage facilities. This packaging distribution method improves the environment and reduces the resources used.

Lightweighting

A major US brewer has reduced its aluminum can ends from a 206 diameter to a 204 diameter. In the past three decades, can ends have shrunk from a 211 diameter. This continual lightweighting for beer and beverage cans has reduced metal usage and decreased costs. The spin flow process of producing metal cans uses less metal in the neck of the can, thins the upper portion of the can and improves quality conformity. This dollar-saving redesign will reduce aluminum use by many pounds per year.

A major anti-freeze manufacturer who fills the product into gallon jugs has now switched to a palletized load consisting of a pallet skirt, a riser and four large trays of 200-pound-test B-flute corrugated. The gallon containers were originally packed in corrugated cases. This newly designed pallet load configuration not only reduces packaging materials, but also uses post-consumer recycled material. The reduction in virgin material goes a long way in preserving our environment.

Reducing Packaging Waste

Hospitals, nursing homes and other related health care facilities are requesting that medical products manufacturers and distributors reduce medical product packaging. The dual objective is waste reduction and increased recyclable packaging components. The goal of reduced packaging waste has led to:

- Complete packaging redesign.
- End users incorporating packaging specifications with their equipment specifications.
- Waste disposal costs now being included in the total product cost.
- End users evaluating vendors as to their commitment to environmental criteria and how they accomplish their waste reduction objectives.

One method to package a fragile medical product which is sensitive to impact, shock, moisture and vibration is to employ a suspension-packaging technique which suspends a product in the air space of the shipping case, holding the product between two flexible, low-slip, heavy-gauge polymer films with corrugated frames. The low-slip properties of the polymer film help eliminate the side-to-side lateral movement of the product. This design flexibility allows the end user to package devices having various dimensions and configurations in the same shipping case. This reduces costs and eliminates waste at the same time.

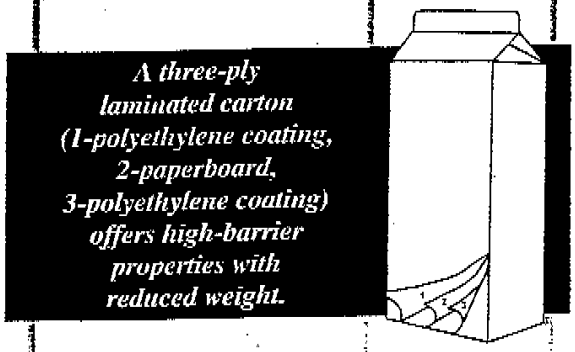
Shipping industrial products in returnable shippers can also decrease costs and eliminate waste, thereby benefitting

the environment. For many years, industrial products were shipped in heavy wooden cases with protective packaging surrounding the product. Heavy steel strapping was used to secure the case, and this cumbersome box was then mounted on a heavy wooden pallet. All this for product protection.

New Packaging Technology

New technologies have now been developed and gradually perfected for the use of a thermoformed, lightweight plastic pallet which holds cartons intact with a built-in flange, consisting of a corrugated sleeve and cover, around a custom-molded, expanded polypropylene interior cushioning material. After the product is removed from the protective package, the empty package can be held in an ventory or returned to the sender, thereby eliminating costly material disposal and its probable buildup in the environment.

Many companies have redesigned their packaging to meet the environmentally friendly objectives. A soup company redesigned its dinner packages by lightweighting the package by changing from nylon plates to crystallized polyethylene terephthalate trays. The aluminum foil seal and plastic dome cover were replaced with polyester-based film. The secondary package changed from a solid bleached sulfate (SBS) carton to a solid unbleached sulfate. The new package is considerably lighter yet structurally strong.



A three-ply laminated carton (1-polyethylene coating, 2-paperboard, 3-polyethylene coating) offers high-barrier properties with reduced weight.

Detergent companies are concentrating their formulas, thereby decreasing packaging material volume with a smaller carton. Cartons are now made of recycled paperboard; scoops packed inside the carton are fabricated of recycled plastic resin; and heavy metal inks have been eliminated from carton printing. The whole package is now environmentally friendly yet requires less material and less energy to produce, and consequently costs less.

Metallizing Technology

Many packaging design changes are taking place in a variety of industries. Cold-seal-film/paper wrappers are replacing foil/plastic/paper combinations on ice cream bars. Metallized film is replacing foil-polymer laminations. Metallizing technology allows using 36-gauge polyester film which has a 50 percent improvement in metal adhesion, resulting in increased seal strength, solid waste reduction and reduced packaging costs.

Technology derived from product development, design and research has created new packaging concepts. Metallization (deposition of metal on polymer film) has replaced aluminum foil in many packaging applications such as multilayer paper and plastic packages.

Container Original Layers	Container Redesigned Layers
Polypropylene	Polyethylene Terephthalate
Adhesive	Barrier
Barrier	Polyethylene Terephthalate
Adhesive	Barrier
Regrind	Polyethylene Terephthalate
Polypropylene	

The metallization process now uses only 25 percent of the aluminum foil that was previously used in foil/film laminations, yet still offers identical barrier protection. Eliminating extraneous layers has increased recycling capabilities.

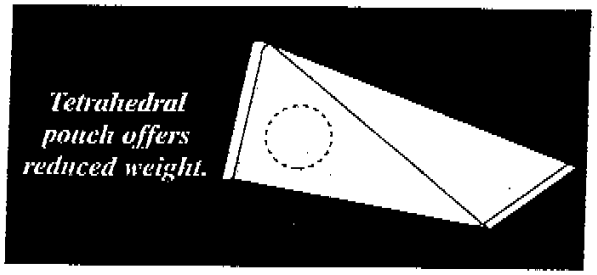
Multilayer plastic bottles now have decreased materials and layers with identical protection available. An example of this redesign can be seen in the above box.

Computer software programs can now design and create containers having unlimited configuration possibilities. In most cases, the redesign is beneficial to the environment. Refillable bottles and pouches to replace throw-away containers, and the complete reassessment of packaging materials by manufacturers is a positive movement toward greater environmental responsibility.

Degradable packaging materials are also an important development in the last ten years. This movement was originally looked upon as the "answer to a maiden's prayers," in that packaging waste would automatically just disappear, quickly and effectively, after the product is consumed.

Degradable Products

What does degradable mean? There are two distinct degradability types. Biodegradability refers to packaging materials formulated to degrade or break down in the soil assisted by chemicals and in conjunction with living microorganisms. Photodegradability refers to packaging material formulated to break down with the help of light or specifically ultraviolet (UV) light.



Tetrahedral pouch offers reduced weight.

The Environmental Protection Agency (EPA) recognizes five basic ways to deal with the solid waste problems that exist in our present industrial complex:

1. Source reduction.
2. Reuse.
3. Recycling.
4. Landfill.
5. Incineration.

Many additions — covering compounds from starch to exotic and complex organic compounds — have been formulated for degradable products. However, degradability has not been a completely successful concept, and questions still remain. Will the packaging materials retain their stability during their life span while surrounding a product? Will the materials perform as claimed? Will the formulation of degradable packaging increase costs? Will the degradation by-products created cause problems to the environment? Will producing degradable products actually decrease the solid waste volume? Will the degradation by-products add to the problem of global warming? Will people look upon degradability as a "license to litter"?

Designing environmental packaging with degradable materials was supposed to solve the waste problem. There is a great deal of research and product development that must be accomplished if we are to continue to look upon degradable packaging materials as a possible solution to that problem.

Package Recycling

Packaging design for future recycling has taken on new emphasis. Recycling packaging material and complete packages has become more and more successful and effective as technology develops. Today, packaging design examines the degree to which materials used, when turned to scrap, can be recycled and become the raw materials for the same product.

Although some materials are more easily recycled than others, almost all packaging materials can be recycled to a degree. Development work has extended the recyclability to aluminum, steel, plastic, glass, paper and wood. Much package design now incorporates an easy disposal requirement. Packaging's ability to be recycled, far surpasses — and is a much more important concept in saving the environment — than the process of landfilling, incineration or the use of degradable packaging. To use a package once and then discard it after it no longer serves a useful purpose is a terrible waste of energy, utility and resources.

Specially designed packaging — either with specific features or material choice — provides the necessary protocol for an environmentally desirable containment system. Therefore, designing environmentally friendly packaging should be our objective to maintain our standard of living, while protecting our resources. ★