

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



1 Introduction

High-density polyethylene containers (PEAD) have been used for decades in a great variety of applications. The first major uses of this technology were the plastic milk bottles and motor-oil packages; since then, many applications have been developed, including containers for both home and industrial applications, to wit: industrial chemicals, food, beverages and spices.

Currently, the total consumption of PEAD (p/p) of blown containers in the US is almost 1.8 million metric tons, where plastic milk bottles take up a total of 363 thousand metric tons and other food applications 36 thousand metric tons. Chemical packages sum up 454 thousand metric tons, while those for motor oil and other motor fluids reach 82 thousand metric tons. ⁽¹⁾

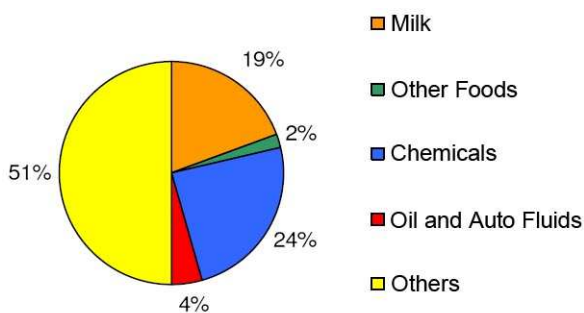


Figure 1. Market segmentation of blown PEAD containers according to their final application.

The commercial milk package appeared after 1884, when the glass milk bottle was invented by Dr. Hervey D. Thatcher in Potsdam, NY. Glass containers were replaced by plastic-covered cartons and in turn these were substituted by manufactured PEAD bottles, introduced in to the market in 1932 and 1964 respectively. ⁽²⁾

The plastic-covered cartons were designed in the 1920's in order to package milk in humid environments. For a long time these containers were a good alternative for consumers since they were relatively easy to handle, unbreakable and provided protection against water and steam thanks to the polyethylene coating. However, the great

flaw in these packages is that they cannot be closed again once they are opened, which is what has provided an advantage to new developments of plastic containers in the beverage market.



Figure 2. Example of blown PEAD containers used for packaging milk.

In North America, at the end of the 60's, blown extrusion molded PEAD bottles were developed, and milk companies were able to start making plastic containers in their own factories in production lines with milk filling operations. Thanks to the advantage of being a container which can be closed again and that it offers excellent product durability, besides having a good appearance, plastic bottles have been displacing plastic-covered cartons in applications for juice containers and especially milk, up to the point in which this technology reaches almost the entire market. ⁽³⁾

Other containers, such as "pouches" (bags) are also used to package milk; nevertheless, plastic bottles are still the most common packages in many countries. ⁽²⁾

PEAD packages are produced in rotating blow machines and machines with carousel production lines. The most common features of both equipments is the hanging parison or vertical PEAD tube from which the bottle is blown, using high-pressure air inside the mold that has the shape of the bottle. The forming of this hanging parison is possible due to the great casting resistance that PEAD exhibits.

In most applications (milk, some juices, some beverages, motor oils and fluids, chemicals for

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



household use such as laundry detergent and dishwashing liquid) do not need high barrier properties (oxygen, CO₂, water steam), thus, containers with one PEAD layer are used. In those cases wherein additional protection is required, several layers of PEAD or PEAD with other materials, such as EVOH or Nylon can be coextruded. ⁽¹⁾

2 How to sell more milk through the package?

During a long period of time milk has been considered as an indispensable product for everyone's nutritional diet. For this reason, not much attention was paid to the marketing of this product and the package was just a means for distribution and storage of this vital liquid.

Nowadays, milk competes in the market with many soft drinks, juices, teas, and bottled waters. These products have managed to reach an important commercial share due to their aggressive marketing strategies and through innovative packages.

In contrast with the design and decoration that many soft drinks, juices, etc. exhibit, in many occasions the largest illustration in a milk container is the nutritional value chart or the bar code. This is why now most milk bottles have presentations considered fashionable.

The milk industry has obtained a great achievement with some advertisements and TV campaigns; but there is little connection with the product at the moment of its purchase: while marketing has the intention of making milk look fashionable, the package does not transmit the message. This is why a change is needed in the way in which the milk is packaged. ⁽⁴⁾

The "MilkPEP Fluid Milk Strategic Thinking" project made a series of recommendations in order to increase milk sales through the package: ⁽⁵⁾

- Improving the visual appearance of existing containers. This task may be done through the label, lid or the container itself.

- Making existing packages easier to use. For this, plastic closing systems or plastic "pouches" can be used instead of coated paper containers.
- Developing new package configurations in order to cover the needs of different distribution channels.



Figure 3. Change in the milk package due to the need to compete with other beverages.

A studied carried out by this same project allows to perceive the relevance of the package for increasing sales: ⁽⁵⁾

- 50% of consumers visit most of the supermarket aisles looking for something new.
- 70% of consumers make their grocery shopping decisions once they are inside the store, not before.
- 55% go to the store with a grocery list which has an average of 10 articles and end up buying 20.

It is clear that in order to sell more milk, it should be advertised better, and this means seeing the package as a dynamic tool that must be regularly redesigned in order to keep consumers interested.

The process of designing a new package must be done as a teamwork, including manufacturing and marketing functions within the company. Despite the fact that designing a new package takes up a considerable amount of time and money, without a guarantee of recouping the investment, there are

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



many companies that faced the commitment and eventually, the newly redesigned package gave notoriety to the brand, better presence on the shelves and finally, more sales.

Redesigning a package should only be done if the company realizes its value as a marketing tool. This includes acknowledging that the constant innovation and updating of packages is imperative. ⁽⁴⁾

There are too many variables that can be redesigned on a package. Among them are: the material and color of the bottle, the shape of the bottle (size, outline, etc.), the lid and the label. In addition to the redesign of the package, secondary products can be included which may help raise the product sales (toys, straws included in the package, etc.).

3 Material: PEAD, the quintessential package. ⁽⁶⁾

Currently PEAD dominates the milk container market due to its low cost, durability and low weight.

Standard PEAD resins produce a see-through container offering some UV radiation protection. In order to prevent oxidative flavors from producing in milk and protecting vitamins and minerals labile to light, anti-UV additives may be added to the resin or also aggregating pigments which offer better protection.

Almost any color is possible; however yellow and white are dominant for liquid milk applications. Consumers prefer the color white because it represents the content of the package in a more precise manner. However, new yellow packages have been introduced into the market and with adequate marketing they have achieved an increase in the sales. Figure 4 represents the new package developed by a US company that, in order to introduce its yellow-bottled product into the market, they used the labels to educate the consumers about the new container. ⁽⁴⁾

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Figure 4. Example of a company that uses the labels to explain the benefits of its yellow container.

Another US company recently updated its image, using PEAD bottles which offer UV protection and additionally give off a clean and contemporary appearance to the product (Figure 5).

PEAD bottles are currently being used to create extended duration packages. The beverages with the longest useful life on the shelf (60 or 90 days) help satisfy the demands of the distribution and storage centers that require a product which does not expire after a few days in the inventory. These features are suitable for milk packages, and they can be achieved through diverse technologies including aseptic processing, ultra-pasteurization, and micro-filtering, among others. ⁽⁷⁾



Figure 5. A company uses PEAD bottles for a new product image.

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



4 Bottle. ⁽⁸⁾

Milk containers have evolved from the glass bottle to the plastic container. However, change does not stop there, due to the new vision that the milk packages should be more than containers.

Bottles with innovative shapes help fulfill the functional and even emotional consumer needs. At the moment of designing a milk package all of the consumer chain elements should be considered, such as: size, shape, easy handling and graphics.

A new brand of milk (Figure 6) created a bottle which can be licensed for milk packages. This package complies with the requirements of distributors, salespersons, food service operators and most importantly, the final consumers. This entails an increase in milk sales.

This container has certain advantages over regular ones and that is what has made the product sales rise:

- It has rounded borders and an accordion-shaped base which makes it ultra strong, offering better grip and fewer spills.
- It has a smaller size that proportionally reduces the price, which allows the consumers to pay the same price for the same amount of milk, but in a better package.
- The container base is narrow, which makes it fit better in the consumer's refrigerator.
- These bottles are structurally designed to withstand loads, eliminating milk ice boxes. Thus minimizing distribution and storage costs.



Figure 6. New milk container design.

This type of package gives the consumers a reason to buy the product.



Figure 7. Bear-shaped package design for selling fruit punch for children

There are two segments that are also effectively marketing their products through a new package design. Figure 7 shows a bottle in the shape of a bear used in Europe to package fruit punch for children.

5 Label. ⁽⁴⁾

The label provides an easy and inexpensive method to promote a product which allows to constantly changing the design in order to keep the consumers interested, it even adds value to the package thanks to the possibility of including information for the client, coupons for other products, etc.

A company located in Ohio takes advantage of its labels in order to connect with the consumers. During Christmas, the company offered a line of collectible bottles (Figure 8) which included different characters related to the holiday.



Figure 8. Example of Christmas promotion (left) and stretchable labels with product coupons (right).

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



Another company modified the label so that it would include a coupon for other products of the same business, including sauces and sour creams; and in this same year it plans to sell the space for publicity for other corporations (Figure 8).

Historically, labels applied with adhesive or those pressure-sensitive have been used in milk jars and the bottle "wrap around". This type of label is not much help due to its limited space; nevertheless, some companies (Figure 9) have satisfactorily used colorful labels to promote their product.



Figure 9. Example of a new pressure-sensitive label, more colorful for the product.

In Figure 10 the new concept of wrap-around labels can be seen applied with adhesive. Called rotating or spinning labels, their main feature is that they have two types of labels: a fixed inner label which contains different information and a removable external label that can rotate over the first one in order to show the information through a window.

This type of label provides up to 75% more space for information about the brand, nutritional value, multiple languages, bigger lettering size for older and elderly consumers, special promotions and occasional marketing.



Figure 10. Example of new rotating labels that offer 75% more advertising space.

One disadvantage of rotating labels applied with adhesive or those pressure sensitive is that they are not eco-friendly due to the unwanted paper fibers or the adhesives they introduce to the recycling system.

Stretchable and heat shrink labels are the new trends in beverage labeling. These labels exhibit similar features: both effectively promote milk and both use eco-friendly adhesives, just as another type of labeling does in 360°: the wrap-around.

In the individual containers category, as the stretchable label uses less material, it is a more cost-effective method to provide advertisement space. However, if a total coverage is desired, the shrinkable label is the one to use.

The shrinkable complete coating label in single portion bottles provides a greater and more powerful advertisement space in order to attract consumers (Figure 11). These labels can also be used to cover entire packages with unique shapes, which are demanded by consumers who seek ergonomically improved containers.

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



Figure 11. Containers with heat shrink labels.

When talking about one-gallon, half-gallon or quarter-gallon containers, heat shrink labels are not the best option, while stretchable labels are the best way to obtain graphics in 360° of advertising space.

The stretchable label is easily removed in order to recycle the container, and since it is less expensive than any of the heat shrink ones, it represents the most economic and ecological option for 360° labels in half-gallon or containers with larger volume.

The wrap-around are 360° labels less expensive for one-quarter or smaller containers. Nevertheless, the adhesive used in such labels may cause the production line to frequently jam, therefore, when considering the total cost of the label, you must take into account the amount of time the production line is not operating.

Chart 1 summarizes the features of the different labels existing in the market:

Chart 1. Attributes of commercial labels.

Attributes	Stretchable	Shrinkable	Wrap-Around	Pressure
High Speed Application	✓	✓	✓	✓
No adhesives	✓	✓		
360° Graphics	✓	✓	✓	
Efficiency in complex geometry	✓	✓		
Low cost of equipments			✓	✓
Possibility of adding coupons	✓		✓	

6 Lids. ⁽⁹⁾

The lids and closing systems are a means to keep the beverage inside the container. They allow maintain the product fresh, prevent leakage through opened spouts, but besides this they can be used for promotions and as marketing tools, adding improvements to the way a product is drunk and they can even turn a container into a collector's item. All in all, the lid can be one of the easiest forms of adding value to the product and creating a difference point in the competitive beverage market.



Figure 12. Lids and closing devices designed for the satisfaction of different client needs.

All flat lids can contain printed labels, or be printed on directly, not only to inform the consumers about the type of milk it contains, but also as a diverse means of promotion. Let's take the case of cartoon characters. If the one-gallon milk containers had famous cartoon characters, children would be able to drink the milk as fast as they could in order to complete their lid collection. Additionally, the lid labels can contain discount coupons for ulterior shopping trips of that product or any other item of that same brand.

Other ideas to promote milk through the lids are:

- The lids can be identified with a particular milk brand in order to make the container more noticeable.
- The lids which include a liner and safety ring can use their inner part to offer instant prizes.
- The lids can come in different fashionable color, such as see-through purple or neon yellow, while the liners can have holographic images.

Another creative idea is to make reusable bottles designed with the child's favorite characters,

BULLETIN: POLYETHYLENE IN MILK CONTAINERS



including lids of said characters. This offers the consumer a greater added-value product and more profit for the manufacturer.

7 Conclusions

Liquid milk processors have seen the milk package as a form of packaging liquid and considered it a cost which had to be reduced to a minimum. Nevertheless, the world trend in the milk market has proven that it is necessary to adopt the vision that containers are much more than that: they are powerful marketing tools that helps sell more milk and to compete with the new beverages in the market.

New ergonomic bottles, colorful labels and collectable figures lids are some of the ways that the package helps to sell more milk. However, there are endless opportunities and it is up to the producer to make the commitment of adapting to a new market vision so that he offers an innovative product. Not only will his milk sales rise, but also the client will receive a greater added value product, he will feel more pleased with himself and the milk producer will be able to consolidate his brand within the aggressive market of carbonated beverages, juices, etc. that have kept the milk on the sideline for so long.

The High-Density Polyethylene (PEAD) represents the most functional and economic option for the production of milk containers. Venelene® 3200B offers a balance of the following properties: transparency, rigidity, impact resistance and

processability, which allow the production of containers with innovative low-thickness designs, which also contributes to maximizing life on the dairy product shelves.

8 References

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