6 Cartons for liquids
ARVE J. IVERSEN

Food is packaged to preserve its quality and freshness, add appeal to consumers and to facilitate storage and distribution. (Codex Alimentarius Commission, 1985)

Introduction

Modern packaging systems for liquid foods are products from a synthesis of demands from producers, distributors, and consumers. The carton board container, or ‘paper bottle’, has been widely adopted because it combines hygienic protection of the product, improved working conditions in production and distribution, and consumer convenience with favourable economy.

The need for hygiene is the primary reason for retail packaging of perishable liquid food products like milk. Although this was realized more than a century ago, packaging techniques for liquid milk were slow in developing. The advent of pasteurization in the 1920s made retail packaging of liquid essential, and the returnable glass bottle was soon to become universal.

The commercial development of plastic materials, starting with polyethylene, PE, in the 1940s, opened new possibilities for improving the hygiene in liquid packaging. PE ultimately became the most frequently used thermoplastic in paper and cartonboard coating processes, also finding its use in in-plant manufacture of packages from reel stock by form-fill-seal techniques. The introduction of one-way packages for milk made the switch to self-service shops feasible, and also widened the market, as an increased number of shops were able to sell milk, thereby making it easier for consumers to buy it. In the current effort to make retailing still more efficient, the focus is on standardized packages and transport wrappings, the aim being to simplify routines and cut costs. One-way cartons are suited to meet these requirements. These developments have gradually led to a change in retail patterns in many countries, and a replacement of returnable glass bottles by single-service paper/plastic containers is observed in many countries.

Today a product distinction can be made between milk and non-milk products on the one hand, and between fresh and long-life products on the other. The main products retailed in one-way cartons are still milk and milk products, holding approximately 80% of the carton demand in liquid packaging, but a steady increase in market share for fruit juices, mineral...
water, sports drinks, vegetable oils and juices, soft drinks and wine is observed. This trend is likely to continue, ensuring a further potential for the paper bottle.

History and development

The carton-based packaging systems were primarily developed for milk and milk products, and there has been a constant evolution in packaging materials and overall system solutions. Other liquids requiring similar technology have benefited from and contributed to the observed evolution. The search for lower overall costs, and increasingly stringent requirements for keeping quality as a result of changes in distribution patterns and market situations, are the driving forces in this process.

A broad overview of developments starts with the paper-based container for milk, gable-top designed and patented in the USA in 1915, and the single-trip wax-coated paper cartons which were introduced commercially in 1929. Due to high overall costs, the carton package was no immediate success until Ex-Cell-O introduced their Pure Pak carton in 1936. The early design was made from semi-bleached paperboard, adhesively sealed, with a reasonable standard of hygiene and liquid-proofness being assured by immersion of the preformed carton in molten paraffin wax. The Pure Pak carton was introduced into the Scandinavian countries, produced on licence for the European market by the Norwegian Elopak Group. Although major developments have been made on the Pure Pak carton, Ex-Cell-O and Elopak retain the gable-top concept.

Meanwhile, in the early fifties, AB Tetra Pak was started off by introducing the idea of forming packages from a roll of plastic-coated paper and filling them in a continuous, closed process. The idea was considered to have a tremendous potential, and represented a radical new idea in the liquid food packaging area. With their first package, the tetrahedral Tetra Standard, polyethylene was introduced as coating, and within a few years thermoplastics totally replaced wax coatings. The Tetra Standard was introduced in 1952, and further development led to the Tetra Standard Aseptic in 1961, which was the first carton for long-life treated products.

In 1963, Tetra Pak introduced the rectangular shaped Tetra Brik to facilitate distribution. The idea of brick-shaped cartons was adopted from the German Zu-pack, but further developed to fit the Tetra Pak concept. In 1969, the Tetra Brik Aseptic was introduced, and the brick-shaped containers are now the main products from Tetra Pak. In the continuous line of developments, technology has reached a point where most non-carbonated liquids may be successfully packaged in cartons, and recent developments and innovations may be characterized as adjustments and refinements of existing technology. The task now seems to be further implementation of existing technology to new markets and new product groups.