



# Position Paper Packaging Technology



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## ■ Packaging Technology

### Introduction

As our society moves toward environmental conservation, an aged population, and highly networked information, the packaging industry is now required to review the social significance of packaging for development and improvement in harmony with society. Our need for food safety and reassurance, environmental consideration, and universal packaging design is now increasing more than ever. Given these circumstances, there is a growing tendency to consider the social and environmental compatibility of packaging among consumers as well as among people of industry, government agencies, and academic circles.

The 21st century is globally called the century of the environment. It is becoming very important to convert our present society systems based on mass production, consumption and waste into a recycling-oriented society system based on recycling and reuse. Work on the so-called 3Rs (Recycle, Reuse, and Reduce) has already begun in packaging and other industries. The participation of local municipalities and consumers as well as people in industry is extremely vital in addressing these tasks.

Consideration for seniors and disabled people is becoming a great movement in society along with the environmental issue. The packaging industry began full-scale efforts a few years ago. The packages created from these efforts are called universal design packages, which have been used for food and toiletries. The difference in how to value universal designs has affected the survival of enterprises.

Along with the two great streams of environmental compatibility and universal packaging designs as described above, the development of packaging technologies specified for ensuring food safety and reassurance has been advancing in recent years. In our ubiquitous society created by advanced computer network technology, quickly promoting the traceability of food and developing packages that indicate information about the food including expiration dates is required.

In our modern society, the full-fledged development or improvement of packages has already started to respond to the three great streams of environmental conservation, consideration for seniors and disabled people, and food safety and reassurance.

This paper introduces the trends in packaging-related technologies seen in these areas by enumerating keywords.

## ■ Developing or improving technologies in individual areas

### Packaging technology trends concerning environmental consideration

Those that have been developed for reducing the environmental load include Eco Inks (Aroma-free Ink, Aqueous Printing Ink, and Soy Ink), and biodegradable plastics that decompose due to microorganisms in the ground or compost. In general, however, packaging materials complying with the needs of society are mainly created by improving or advancing existing technologies rather than by developing new technologies. The needs of society include promoting the 3Rs (Reduce, Reuse and Recycle), formulating a deposit and refund system, and establishing an LCA (Life Cycle Analysis). What types of packages should be developed to address the 3Rs by defining the recycle ratio and setting the numerical target goal for each product becomes a challenge that each enterprise should address as a top priority.

Since consumer participation becomes extremely important in environmental consideration, packaging technologies must be developed or improved in accordance with standardization efforts, such as establishing related laws and regulations, and the quantification of the LCA technique.

### Trend of packaging technologies considering seniors and disabled people

Packages considering seniors and the disabled, as represented by universal or accessible design, must be designed for everyone to easily use irrespective of age, capability and lifestyle. Packaging has responded to these requirements by improving or advancing existing technologies. Packages developed so far as convenient for everyone to use include notched paper containers for drinks, easy-to-grip bottles provided with an indentation for easily grasping the plastic bottle, and package containers with notched sides so users can differentiate similar package containers from each other to prevent improper use.

Another equally important aspect is improving the technology for tamper-proof seals that can easily detect the breaking of the seal or opening of the package to guarantee a hermetically sealed package container, and child-resistant technology to prevent children from easily manipulating packages consciously or unconsciously.

The evaluation method for universal and accessible designs and the standardization of design guidelines considering seniors and disabled people are now important elements for developing or improving packages.

## Technologies for highly functional packages

This area naturally still includes technologies for environmental consideration and considering seniors and disabled people as mentioned above. There are many highly-functional packages developed particularly for food safety and reassurance.

First, in paper manufacture and paper boards, the development or improvement of technologies is advancing for producing paper containers which can be used for liquid, replacing conventional cans, bottles, and plastic bottles, as well as for producing paper-made cushion materials, paper-laminated cans, heat-insulating paper cup, paper containers water-proof-processed at edge faces, non-staple cardboards, pulp molds, and micro flute packaging. In transport packaging, functional cardboard is under development including cardboard that is recyclable, excludes moisture, conducts electricity, and is waterproof, corrosion proof, and insect proof.

Second, the development of technologies concerned with food safety and reassurance is remarkable in plastics. Representative technologies relate to active and intelligent packages. The active package itself reacts with the environment to change its attributes, thus improving the quality, safety, expiration date, and usability of packaged contents. The intelligent package has mechanical, electrical or scientific monitoring and is able to display changes in the quality of its packaged contents over time. The technological development or improvement of packaging is advancing with light-blocking film, transparent and evaporated film, nanocomposites, passive packages, microwavable containers, retort-related containers, and more.

Third, in metal products, an embossed can has been developed which has a rugged part on the can body to make it distinctive in terms of both design and printing. In addition, the developed products include resin laminated cans, diamond-shaped pattern cans, and resealable cans.

Fourth, in glass products, the representative packages are ultra-lightweight bottles developed as a container friendly to the environment and compatible with our recycling society, and UV-cut transparent bottles that protect their contents by blocking harmful ultraviolet rays. The development of technologies for these packages is still progressing. The greatest attention in this field, however, is focused on the manufacture of bottles using cullet made from recycled broken bottles with a ratio of over 90%.

The advancement or improvement of other packaging technologies is now under way to respond to the three streams of environmental conservation, considering seniors and disabled people, and food safety and reassurance. In particular, further improvement has been made in the technologies of the existing aseptic fill system, foreign-matter-detection, soft-X-ray inspection, marking, in-mold labels, in-line blow fill, shrink labels, and blow-off.