

Present Status and Future Prospects of Open Refrigerating Display Case

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1. Introduction

For food retail stores like supermarkets and convenience stores, store-use large open refrigerating display cases are necessities. These cases have been developed with features including self-service and modernized cold-state distribution for perishable food.

Since their introduction into Japan in the latter half of the 1950s, supermarkets have rapidly grown into large stores. However, to protect small food retail stores, the Large-Scale Retail Store Act from the late 1970s was enacted and their increase was slowed down. This Act was the subject of the U.S.-Japan Structural Conference in the late 1980s, which resulted in deregulation and law amendment. The time for large stores has come again. Now, there is severe competition for survival among stores focusing on systematization of national chains.

2. Changes in Market Needs and Fuji Electric's Technology

Fuji Electric began manufacturing open refrigerating display cases in 1972 and has successively developed products through technical development to meet market needs. The main topics are described below.

2.1 Changes in market needs

The era when any goods on display were sold (the 1960s and 1970s) shifted to the era of quality-orientation (the 1980s). From the latter half of the 1980s to the 1990s, needs tended toward better goods that were lower in price. A new conception developed: the store is not a storage area for goods but a salesroom with displays and a buying room with suggestions.

The diversification of eating habits and the diffusion of prepared and semi-prepared food (daily dishes) due to an increase in the proportion of working women have brought about an increase in the number of different items. This in turn necessitates ease in the purchase and selection of goods, which attaches importance to display efficiency and stage effects of the refrigerating display cases.

Since the regulation of the Large Store Act limiting multiple store development, importance has been attached to a reduction in goods loss and the quality of freshness control in selecting a refrigerating display case to improve the income of food retail stores and secure customers' reliance.

In particular, uniform refrigeration to minimize any difference between cold storage temperatures and minimization of the influence of defrost cycles on the stored goods are major points. Ever since the incidents of food poisoning by the pathogenic colon bacillus O-157 last summer, more careful temperature control has been demanded. As a result, antibacterial treatment for refrigerating display case materials and surfaces to prevent the propagation of bacteria has been introduced.

Due to the rise in crude oil prices in 1980, the impact on supermarkets by the increase in power rates was so serious that energy-saving measures including the use of two-layer air curtains, increasing efficiency of the basic functions with simulation technology, optimizing the basic structure, and raising the power factor of the lighting have been energetically pushed. As a result, required electric charges have been reduced by half or more.

After striving for measures concerning fluorocarbon control in connection with ozone layer protection, Fuji Electric put an end to the use of all "specified fluorocarbons" and has substituted materials with a lower factor of ozone layer destruction at the end of 1995. Separate from ozone layer protection is global warming prevention. Substitutes with a large greenhouse effect were determined at the 7th Treaty Powers' Conference held in December 1995, and Fuji Electric is attempting to replace them. In October 1996, our refrigerating display case plant received recognition of the international environmental standard ISO14001, a first for Fuji Electric's plants.

On the other hand, since the opening of the first store in the mid 1970s, convenience stores have rapidly spread in urban communities. Conveniences such as 24-hour operation match our present society, so they still maintain a very high rate of growth and are spreading throughout the country. Because of the

severe air conditioning in stores, reach-in refrigerating food cases with glass doors were primarily installed. However, to facilitate removal of goods and due to a rapid increase in the sale of pre-packed lunches and sandwiches, small open refrigerating display cases are gaining popularity.

2.2 Technical developments

Many new products and technical developments that meet market needs have been realized. Among them, the following technical developments are highly rated in the market and verified as “Fuji Electric’s technology”, demonstrating our leadership in the industry.

2.2.1 Air defrosting

With the air curtains kept in operation, defrosting is performed by introducing room air around the evaporator and using its energy as the heat source. Therefore, this is an energy-saving, highly reliable defrosting system requiring no electric heaters. It is patented in 11 countries around the world.

2.2.2 High-freshness control technology

The icing temperature high-freshness display case can keep food as it is at an icing temperature range (−2 to −5°C), just before the food freezes. It operates nonstop by reciprocally operating and defrosting the two evaporators.

2.2.3 Total control with microcomputer

By means of optimum control for each individual case, the F/M microcomputer reduces running costs and greatly improves adaptation to the environment. It is also highly reliable and easy to install and maintain. It is standard for all types, a first in the industry, and total control is now possible.

2.2.4 Fuzzy refrigerating display cases

The fuzzy refrigerating display case can judge changes in the ambient environment by itself. It is an industry first, and performs fuzzy control for optimum defrosting, saves energy and attains high-freshness control.

Table 1 shows the changes in market needs and Fuji Electric’s technical developments.

3. Future Market Needs and Fuji Electric’s Attitude

Competition between supermarkets is predicted to increase, and excessive competition has started between local convenience stores, which are continually growing. To realize everyday low prices for goods, store equipment such as display cases requires rationally integrating initial, running, and maintenance costs and improving equipment reliability.

In the food retail industry, the proportion of labor cost is high, and there are growing demands for

Table 1. Changes in market needs and technical developments

Year	Market needs	Technical developments
1974	Large Store Act enforcement	Foreign patents for air defrosting
1976	Increase in local branches	
1980	Oil crisis Energy saving demanded	Two-layer air curtains
1984	Display efficiency and stage effects demanded	Semi-multi-deck series
1985	Freshness control demanded	Icing temp. nondefrost series CVS lunch refrigerating display cases
1990	Environmental problems (ozone layer protection) Energy saving demanded again	Microcomputer controllers
1993		Fuzzy refrigerating display cases
1995		Specified fluorocarbons for foaming agents and refrigerant discontinued
1996		Environmental standard ISO14001 recognition

equipment and devices to reduce manpower and labor. In addition, because labor shortage is still a big problem for installation and maintenance, efforts for simplifying installation and fault prediction technology are required.

In addition to tackling global environmental problems such as ozone layer destruction and global warming prevention, efforts will be made to develop products that minimize environmental degradation and environmental preservation based on life cycle assessment. Such measures include industrial waste reduction and recycling.

China and Southeast Asia are in a state of rapid economic growth and are expected to be profitable markets for the refrigerating display case business. Fuji Electric plans to enter into a joint enterprise with China and begin overseas production in the latter half of 1997.

4. Conclusion

Among the innovations of Japanese industrial structure, the open refrigerating display case area of the food distribution and retail industry has rapidly raised its position and is expected to receive a large amount of equipment investment. To be at harmony with the changing social environment, we will develop new products fulfilling customer needs and would appreciate it very much if the parties concerned would offer us further guidance and help in the future.



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