

The atmosphere is what matters

NEW MATERIALS AND OPTIMIZED MACHINE TECHNOLOGY KEEP BAKED GOODS FRESH LONGER UNDER A PROTECTIVE GAS ATMOSPHERE, AND OFFER CONSUMERS MORE CONVENIENCE



++ figure 1
Due to the perforation, the Duo-Shell can be divided into two separate containers

+ Long shelf life and freshness are really mutually exclusive. However, the manufacturers of packing machines and materials have made it possible to achieve both at the same time. The ongoing trend towards convenience has driven forward the development of MAP packaging (Modified Atmosphere Packaging). Packing under protective gas also opens up new areas for the bread and baked goods industry. Nowadays pre-baked bread and bread rolls for baking off at home can be stored for several days without preserving agents and without refrigeration, and the consumer can bake them off freshly at any time. Manufacturers profit from reduced goods spoilage and waste at the same time. For this purpose the products are packed and sealed in tubular bags or deep-drawn trays, and the air in the package is replaced with a gas mixture matched to the product. The flavor, quality, consistency and nutrient content are not harmed by this kind of preservation.

Specific properties

The gas atmosphere must be chosen taking into account the respective food and its properties. In the case of products with a low fat content and high moisture content, e.g. bread, it is necessary in particular to inhibit the growth of microorganisms. On this other hand if the product has a high fat content and low water activity, for example Dresden stollen, then protection against oxidation is the most important. MAP gas mixtures normally consist of natural atmospheric gases: carbon dioxide (CO₂), nitrogen (N₂) and oxygen (O₂). Each of these gases has its own specific properties that affect its interaction with the food. The above-mentioned gases are used either as pre-formed mixtures or individually. Carbon dioxide or a mixture of carbon dioxide and nitrogen is used for bread and baked goods and for sandwiches.



++ figure 2
Recyclable polypropylene is used for all the trays

Carbon dioxide is the most important gas in the MAP technology area. The growth of the majority of microorganisms such as mold and the most common aerobic bacteria is inhibited by carbon dioxide. On the other hand the growth of anaerobic microorganisms is less adversely affected by this gas atmosphere. Carbon dioxide suppresses microbial activity by effectively dissolving in the liquid and fatty phases of the foods, thus reducing their pH. Therefore, so as to utilize the advantages of various gases, mixtures of at least two gases are used for MAP in most cases, whereby the optimum ratios vary from product to product.

Nitrogen is an inert gas. Its main purpose in packing is to displace oxygen, thus preventing oxidation. Due to its low solubility in water, nitrogen also prevents the packaging from collapsing, because the internal volume is retained.

For pre-baked bread such as baked bread loaves, tortillas, baguettes and pitta bread, the oxygen is replaced with carbon dioxide to retard mold growth. The product can then be stored for 5–20 days in the MAP packaging.

Determining the ideal protective atmosphere for sandwiches is often a challenge due to the different toppings. As a rule, a mixture of carbon dioxide and nitrogen prolongs the shelf life by five or six days.

Matching trays for every snack

Sandwiches with fresh ingredients are an ideal on-the-road snack for many consumers. Suitable freshness packaging is needed to enable them to be transported securely and in an appetizing way. For example Duo-Shells made of polypropylene from the ES-Plastic GmbH & Co. KG, Passau, Germany, in a format 190 mm wide, 144 mm deep and 43 mm high are suitable for this. A perforation allows the package to be divided into two separate containers.



++ figure 3
Fresh bread rolls for baking-off can be stored for several days



++ figure 4
Superclear is a transparent film that is easy to deep-draw. Ten layers provide high stability and maximum product protection

To ensure that bread roll compositions look good even after a couple of hours, they must be appropriately sealed. Whereas the Duo-Shell with a cover or film seal can also be sealed hygienically via the rib, the other packagings are sealed exclusively via MAP. The shells are manufactured from fully recyclable polypropylene (PP) or from a PP-EVOH (ethyl vinyl alcohol) composite laminate. If the snack doesn't fit into the common standard formats, ES-Plastic will on request also fabricate out-of-the-ordinary shell creations, e.g. shells with

distinctive shapes or shells in which the products lie fanned out. An optional logo can also be embossed at the side on all the sandwich trays. Series production takes place in a transparent design, and is optionally produced in Pantone colors. Fitting with A/B stacking prevents slippage or jamming, and promotes quick, easy mechanical processing. A/B stacking means that the trays are equipped with stacking knobs. Without these the trays would push into one another or would be difficult to separate from one another, e.g. like conical drinking glasses. ▶

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++ figure 5
Mondini's Traysealer can also seal plastic trays with cardboard lids

For long-life sandwiches in a classical plastic-based MAP pack, the Ribbeck GmbH in Bad Bramstedt, Germany, markets Traysealers from Mondini s.p.A. in Italy. In the Spanish or Italian region there are also systems in which a coated cardboard is used and achieves almost the same values as plastic. However, these are patented for the respective manufacturers there and are not available on the open market. The machines need no modification for this purpose. In a normal Traysealer the cardboard trays are put into the molds, manually filled and then sealed. Automated insertion of the sandwiches is not yet available.

Barrier films offer new possibilities

According to information from the company, an advanced extrusion process for films developed by the Wipak GmbH & Co. KG, Walsrode, Germany, should enable the efficient, more environmentally friendly use of raw materials. It yields thinner films that provide optimum product protection for bread and baked goods. Depending on the application, the film thickness can be reduced by up to 35% compared to



++ figure 6
The semi-automatic T 250 Traysealer can seal 16–20 trays/min

conventional films, which reduces the packaging's CO₂ footprint. The Superclear and Nice series of films are manufactured by this process.

Superclear is a transparent, easily deep-drawable film. Ten layers provide high stability and maximum product protection. Superclear is available in thicknesses of 60 to 250 µm and is suitable for pasteurizing. Nice is the alternative to semi-rigid films. It is available in thicknesses of 250–500 µm and can be finished with or without EVOH. The film thickness can be reduced by up to 35% compared to conventional films. Up to 18 layers provide extreme strength with less use of material. Properties such as transparency and skin effect (with Superclear) and a very close-fitting film together with shape stability and rigidity (with Nice) are achieved by the advanced extrusion method and special formulations of high-performance polymers developed by Wipak. Superclear and Nice can be processed on all the usual packing plants.

Flexible machine technology

For deep-drawn packages and trays, the Multivac Group, Wolfertschwenden, Germany, has developed a variable packing machine, the Model R 225, which is designed for the medium performance range and packs baked goods under vacuum or in a protective gas atmosphere. Its performance depends on the size of the trays. Due to its modular construction, the machine is very flexible with regard to the use of packaging materials, cutting systems and formats. The R 225 can be integrated into automated packing lines.

The semi-automatic T 250 Traysealer can seal 16–20 trays per minute. With its generously sized and variably divisible tray drawer, the T 250 can be used flexibly to pack both confectionery goods and smaller portions. The Traysealer processes various plastic, cardboard and aluminum trays as well as a wide variety of top films, e.g. with a high barrier or anti-fog finish.

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++ figure 7

The Pack 301 LD is suitable for a wide spectrum of products; especially for fresh and perishable goods that require a protective gas packaging (MAP)



++ figure 8

In contrast to rotary systems, the co-moving system enables longer sealing times, which guarantees the creation of perfectly air-tight seal seams

Multivac offers its two chamber models C 200 and C 400 to pack baked goods and ingredients in bags in the store. Due to its compact dimensions, the smaller C 200 is flexibly usable as a table-top machine. It needs only a small footprint and packs quickly and efficiently with a high pumping capacity. Its big sister, the C 400 single-chamber machine, is capable of flexible settings with regard to the arrangement of the sealing rails and chamber heights. Both machines have a chamber cover fitted with a viewing window that enables an unobstructed view of the packing process, thus simplifying operation even for inexperienced personnel.

New plants increase efficiency

The efficiency of MAP packing is improved even further by new developments. Modern packing machines that include the gas mixers and controllers, gas analyzers, hoses to feed gas into a package atmosphere and tube bag machines are a basic precondition for an effective MAP application.

Packing processes with more than two gases require the integration of a gas mixer, whereby manufacturers can choose between manual and digitally controlled mixing. Digital mixers are more expensive, but they enable greater precision and the pre-programming of mixtures. Product changeovers take place quicker, which increases the manufacturer's productivity.

While the required gas mixture is fed into the pack and the unwanted gas is released from it, the tube bag machine ensures the all-decisive sealing of the package. Leaks impair the protective function of the gas mixture and thus the product's shelf life.

Improvements in the sealing properties of tube bag machines, including longer sealing times, enable hermetically leak-tight packages nowadays. Robert Bosch GmbH Packaging Technology, Waiblingen, Germany, will on request equip all horizontal packing machines with an MAP system. However, MAP is especially suitable for the Pack 301 LD and Pack 301 ID tube bag machines. These plants, which are fitted with special sealing jaws for longer sealing times (Long Dwell),

create a hermetically leak-tight pack, so gases can neither penetrate nor escape. The Pack 301 ID has an inverse design of the forming shoulder, which is particularly suitable for handling multipacks. In contrast to horizontal forming shoulders, the product supply feed can take place via a simple conveyor belt. The transfer point to the forming shoulder is a straight edge. The supply of the film from below enables safe, simple transport of the products through the machine. With a sealing time of up to 1 sec, the tube bag machine provides hermetically leak-tight seams at the same time as a high production performance. Due to the continuous servomotor-controlled sealing, the Pack 301 LD achieves a cycle time of up to 150 packs per minute. Independently operating temperature controls on the upper and lower sealing jaws give an additional increase in seal quality. The new seal system automatically detects the presence of product parts between the cross-seam jaws. The pack that is detected in this way is not sealed, and is rejected downstream of the sealing station. This prevents major contamination and damage to the sealing jaws.

Freshness retention

Linde AG, Pullach, Germany, has developed the new MAPAX-LD system to detect leaks on packages under a protective atmosphere. The innovative technology uses hydrogen as the detection gas instead of carbon dioxide or helium. For this purpose a small amount of hydrogen (approx. 3 %) is added to the packing gas. Slight mechanical pressure on the pack allows hydrogen to escape from the pack if there is a leak. Due to the sensitive hydrogen sensor, the process operates considerably faster than conventional variants, and detects even the tiniest leaks in fractions of a second. This means the system can be used in-line, i.e. during production. The MAPAX LD system is positioned downstream of the packaging machine and can be adjusted to the respective belt speed. Testing at a rate of up to 60 cycles per minute is possible, depending on the pack size. Tube bags as well as trays of various heights can be tested. +++



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