

Customised properties profile

THE RANGE OF PRE-PACKED BREAD AND BAKED GOODS OFFERED IN SUPERMARKETS IS CONSTANTLY GROWING. THERE ARE PACKAGING MATERIALS TAILORED SPECIFICALLY TO THE VARIOUS MARKET SEGMENTS TO MEET THE ASPECTS OF SAFETY/SECURITY, SHELF LIFE, AND NOT LEAST ECOLOGICAL SUSTAINABILITY



++ figure 1
A bag with a see-through window with the appearance of a paper bag: this high-quality packaging was developed for fresh Italian baked goods

+ A distinction is made in the mass-produced goods area between ready-to-serve baked goods and those prepared for final baking. Nowadays the properties of the packaging material used can be matched precisely to the application and the required marketing potential. Ready-to-serve baked goods are packed in simple OPP (oriented polypropylene) or PE film bags. These bread packagings function mainly as handling protection packing, and most of the products have a shelf life of only a few days. Such bread packagings are offered as prefabricated bags or are manufactured on tubular bag (form, fill and seal) machines. As a rule a protective atmosphere is not used here, since only a short shelf life is required.

Baked goods prepared for baking-off, e.g. bread rolls, are packed mainly under protective gas and using flexible multi-layer film. Since a very sensitive product is involved, high barrier films with very good impermeability to oxygen are used almost exclusively in this case. These bread packagings must also display very small residual oxygen values after packing on the packing machine. Excessively high residual oxygen values can lead to mould growth due to storage at

room temperature, and the product is spoiled. In practice this high-quality bread packaging achieves a very long shelf life, two to three months in most cases.

These bread packagings are usually manufactured using form-fill-seal machines or deep-drawing machines. Due to the multi-layer composite films that are used, they can have high-quality flexo or rotogravure printing on the intermediate layer, and can thus be given a distinctive individual appearance.

Fresh from the foil

Coextruded films can be matched to the requirements of the most varied products by combining widely differing materials. Freshly baked bread, in particular, often has sharp points and edges, so the packaging should have high puncture

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strength. At the same time it must be impermeable to oxygen so the bread retains its freshness.

The Südpack Verpackungen GmbH & Co. KG Company, Ochsenhausen, Germany, offers a material specifically matched to these properties in the shape of its bread (BT) film series. BT films are based on a polyamide/polyethylene multi-layer composite. Their outer layer gives the films the required puncture resistance. A film quality with high barrier properties against oxygen and water vapour was achieved by specific technical modifications. An added characteristic feature of BT films is their small shrink-back, thus the package always keeps its shape. BT film is transparent, so consumers can recognise the contents directly in the supermarket.

Another property of BT films is their deep-draw capability, allowing baked goods to be packed quickly and cost-effectively, with Modified Atmosphere Packaging (MAP) as well if required. Protective gases such as nitrogen or carbon dioxide and the high barrier properties of BT films keep baked goods fresh for a long time.

Attractiveness is increased by high-quality gravure or flexographic printing of the top layer films. For example, the films can be printed with an additional matt lacquer using the surface flexographic process to achieve a paper-like surface structure. This allows smaller font sizes to be printed compared to gravure printing, and the print preparation time is shorter.

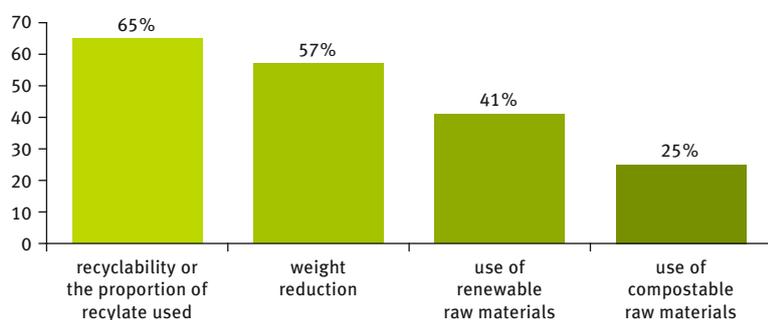
For example, the bread bakery Panificio Italiano Veritas GmbH, Munich, Germany, uses BT film with a paper-like appearance for ciabatta, focaccia and panini. Veritas delivers fresh and bake-off goods to supermarkets every day. The bread is packed in deep-draw film in the bakery. This is why Veritas could not consider simple films or paper as a packaging material. Veritas packs its bread products using a deep-draw machine from the Swiss machinery manufacturer VC999 (Inauen Group) (figure 1). ►

DuPont makes sustainability a priority

A worldwide survey carried out by DuPont among manufacturers of packaged consumer goods and packaging companies has shown that sustainability and costs are the biggest challenges facing the global packaging industry. Almost 500 packaging specialists from all regions of the world replied to this question, which allowed a free choice of answer, and mentioned these two points twice as often as all other challenges.

DuPont Packaging & Industrial Polymers produces a broad portfolio of adhesion promoters, barrier plastics, peel and sealing media, and has at its disposal a worldwide networked development team to work jointly with clients on packaging projects that help protect the product and the environment, increase on-shelf attractiveness and consumer friendliness, and reduce packaging costs.

Most important objectives in the development of sustainable packagings



A survey carried out by DuPont among manufacturers of packaged consumer goods and processors shows that recyclability and weight reduction are the main objectives in the development of sustainable packagings. According to DuPont, a reduction in packaging weight can allow more environmental compatibility as well as cost savings.

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According to another result of the survey, meeting the challenges in the sustainability area requires a variety of strategies. Of those respondents that deal specifically with sustainable packagings, 65% said that they concentrate on product development with regard to recyclability or the proportion of recylate used. For 57% the focus is on weight reduction, 41% emphasize renewable or bio-based construction materials and 25% concentrate on compostable construction materials.

DuPont Packaging & Industrial Polymers now offers a steadily growing portfolio of solutions designed to support efforts towards more sustainability. For example, DuPont Biomax Strong Modifier can promote a wider use of bio-based PLA (Poly-Lactic Acid) products by improving certain properties such as workability, resistance, impact strength, flexibility or heat resistance, and by reducing their brittleness so that films manufactured from them rustle less. DuPont Appeel 22D843 is a new solvent-free seal medium for lidding applications that can improve the sustainability of convenience packages by replacing solvent-based lacquers that require expensive recovery processes. In lid structures or as a sealing layer in heat-sterilizable packagings made from polypropylene (PP), Appeel also helps to protect the contents by ensuring sealing seam leak-tightness.

With their performance profile, DuPont Surlyn Ionomers can replace lower performance plastics in packaging structures, thus helping to increase sustainability by decreasing material usage and reducing total packing costs. According to DuPont, in Europe alone in the past year, the change from polyethylene to higher-performance Surlyn Ionomers has reduced the consumption of packaging materials based on non-renewable raw materials by more than 100 t and decreased the carbon footprint of these packagings by 20%. +++



++ figure 2
Wicketed bags from Unterland are suitable mainly for packing in fully automated high-speed filling processes

Tailor-made solutions

The Unterland Flexible Packaging GmbH Company, Langkampfen, Austria, is a long-standing supplier of high-quality bread bags and bread film to major bakeries as well as regional bread producers in Europe. Through continuous collaboration with clients and packing plant producers, the company has risen to become the leading producer in the bread bag area in the European region. It has experienced rapid development, with an annual capacity of 350m items, and now supplies customised packaging solutions for many types of bread, e.g. fresh bread, toast bread, wholemeal bread, crusty bread and small baked products. Numerous improvements relating to sterilisability, weld seam and film strength have been achieved thanks to its strong research and development department.

The latest type of bread bag, the PP103, was developed specifically for mechanical packing, and according to the company it enables a performance increase of up to 30%. Its other features include good visual and mechanical properties, and it is also suitable for packing bread varieties with sharp and hard surfaces.

Unterland bread bags are manufactured from CPP (cast polypropylene) in its own extrusion plant. This ensures that the films have consistent high quality, and any possible client's requests regarding film properties can be implemented immediately. Its own repro print shop and cooperating reprographics companies can prepare even the most complicated print images for printing in a very short time. Printing cylinders in 45 different dimensions enable a large number of impression repeats to be offered. Modern 10-colour flexographic plants place the required motifs onto the product in



++ figure 3
Sustainex is a versatile, sustainable packaging material that can be used for a wide variety of applications

optimum quality. The processing plants can produce bags in a variety of sizes and designs. Depending on the client's specifications, the bags are packed either on wickets or blocked. Bread bags can be produced with a circular base, tear-off perforated flap and can be perforated or non-perforated.

Magnificent presentation

Unterland's wicketed bags are suitable mainly for packing in fully automatic, high-speed filling processes. The extrusion, printing and fabrication of the wicketed bags offer a high level of service and flexibility. As a "one-stop-shop", Unterland examines the requirements individually and produces bags in the widest possible variety of designs. The product is presented in the best possible way, with high-quality 10-colour flexo printing and gleaming transparency. As a result of collaborating with major bakeries and machine manufacturers for many years, the wicketed bags have optimum compatibility with automatic machines and high sterilisation resistance.

The many years of experience in wicketed bags is concentrated in the competence centre in Kufstein, Austria, to enable attractive, economical solutions to be offered from a single source. Wicketed bags are available in CPP, PE and bio-polymer (Sustainex) designs, and are characterised by consistent sealing properties and an excellent visual appearance. Due to the hygiene-certified production process (EN 15593), the bags conform to the food industry's stringent requirements. The products offer high transparency and print durability, even for CPP deep-freeze applications (see figure 2).

As a biodegradable, compostable and reusable packing material, the Sustainex product family from the Mondi AG Company, Vienna, Austria, is a sustainable alternative for food packagings. Sustainex biopolymers consist of renewable raw materials produced without any genetically modified organisms. Packaging products coated or laminated with Sustainex display the benefits of both paper and board and of biopolymers. This yields a versatile, sustainable packaging material that is usable for a wide variety of applications (see figure 3).

Compostable bio-films

The subject of sustainability is playing an ever-increasing role in film development. In collaboration with Plantic Technologies Limited, the Klöckner Pentaplast GmbH & Co. KG Company, Montabaur, Germany, markets Biofilm TPS rigid films (Thermo-Plastic Starch-based films) for food packaging. The films, which contain proportions of renewable raw materials, are an alternative to conventional plastics, thus enabling trademark proprietors to achieve their sustainability targets.

With an 85–90% proportion of renewable raw materials by weight, Biofilm TPS films are entirely novel plastics. This high-performance material is produced from renewable starch with a high amylose content. This non-genetically-modified raw material is one of the world's most widespread and most economical cultivated plants.

The films are compostable by specialist companies and are certified in accordance with ASTM D6400 and EN 13432 (Biodegradable Products Institute in the USA, DIN CERTCO in Europa), which enables alternative possibilities for the disposal of this film. The film is used commercially worldwide in deep-drawn packages. Packages made from Biofilm TPS films are suitable for low-moisture food-stuffs such as biscuits or chocolate. Their characteristic features are ►

Sticker stops mould growth

Oxygen is one of the main causes of food spoilage. The effect ranges from discolorations to the growth of aerobic microorganisms such as mould. Whether due to oxygen in the package headspace, permeation of O₂ through the packing material or oxygen in the packed goods: sensitive foods spoil more quickly and therefore need special protection to prolong their shelf life. That may possibly change thanks to a Dutch invention: the Dutch company O₂Control has developed an active packing solution in the form of a self-adhesive oxygen absorber that can also be used for baked goods. The label is stuck on inside the packing and ensures that the product retains its original flavour and stays fresh longer. This results in less spoilage, fewer waste items and fewer preservatives.



The self-adhesive oxygen absorber can be applied to the outer surface of the inner packing; this keeps the product fresh for longer

Sillevis Smitt, Managing Director at O₂Control and inventor of the freshness labels with the FreshCare trademark, says: "It's a sealed label similar to a small sticking plaster containing fine iron powder. A natural process takes place in the pack: the iron powder oxidises until no more oxygen remains in the package. The result: mould development is completely prevented and fat oxidation effectively combated." O₂Control markets FreshCare in Europe and the United States. The central administration is in Amsterdam. The Central European region is looked after from the Mannheim site.

Oxygen absorbers are much more widespread in Asia than in Europe. Small bags with a corresponding mode of action are added to billions of fresh products every year. Alternatively FreshCare labels can be positioned at the optimum point in the package to clear all of the oxygen. This is far more attractive than the conventional small bags that are put into the package loose.

The labels can be stuck on inside each pack automatically in the production process. FreshCare can easily be integrated into the production or packing process. The stickers are supplied on rolls packed in barrier material and are dispensed by conventional labelling machines. Rolls with 2,500 or 4,000 stickers are available. Depending on its size, an oxygen absorber can absorb up to 1 l of oxygen. +++



++ figure 4
Bread packagings that degrade without any residue to water, carbon dioxide and biomass, thanks to AddiFlex

flavour protection and resistance to fats. These films were developed for processing on normal deep-drawing machines and run successfully on deep-drawing machines with contact or radiation heating systems. They are certified in accordance with various packaging codes of practice and fulfil the FDA guidelines as well as all the currently valid EU Directives and Regulations for direct food contact. They can also be printed on, sealed and marked by laser.

Sustainable additives

Specific biodegradability can also be achieved by additives in the film. Since the start of this year the Ter Hell & Co. GmbH Company, Hamburg, Germany, has marketed the additive AddiFlex made by the Swedish manufacturer Add-X Biotech AB. Innovative additives of this kind can be used to impart specific biodegradability properties especially to packing materials made from standard plastics (including PE, PP and PVC). The long-lived polymers are converted into water, carbon dioxide and biomass during composting. This enables more stringent environmental regulations to be supported actively during the manufacture of the packaging. In addition, the demand for material is reduced and the energy expended during the processing operation is decreased. The Swedish producer's applications technology department can customise AddiFlex in accordance with the requirements profile, depending on the construction material and intended use. Ter Hell maintains a wide range of blended formulations ready for use for

standard requirements such as plastic bags or shells. Basically the respective additive system (in most cases AddiFlex combined with a high-percentage calcium carbonate masterbatch) is designed in such a way that application-related periods of time are defined for storage and processing as well as for use and degradation. This allows the efficacy and biodegradability at the end of the product life cycle to be controlled specifically.

AddiFlex starts by oxidatively decomposing the long-chain polymer molecules and makes them accessible to microorganisms. The additives incorporate themselves into the thermoplastic structures. This weakens the cohesion of the entire structure. The product's surface becomes hygroscopic (hydrophilic) and, combined with the processes occurring in the controlled composting, the plastics are converted completely into water, carbon dioxide and biomass, leaving no residue.

Add-X Biotech's additive systems demonstrate their ecological efficacy and economic efficiency in many practical standard applications such as food packagings. Moreover, according to a company statement, these results have been corroborated and confirmed by numerous independent testing agencies such as the Swiss EMPA (Federal Material Testing and Research Institute) and the Swedish National Testing and Research Institute (see figure 4).

Thin barrier films

Barrier and ultra-high barrier films based on BOPP (biaxially oriented polypropylene) are supplied by the newly founded Extendo GmbH Company, Kempten, Germany. Extendo plans to offer its clients optimum product protection and noticeable materials savings with a series of novel films. BoPLA (biodegradable oriented) films based on renewable raw materials are also offered.

Highly innovative technologies for biaxial stretching, co-extrusion and coating with aqueous solutions are used in producing the films. The processes enable the production of multi-layer films that are extremely thin while at the same time being robust and with a high gas and water vapour barrier. In addition they provide the user with new, effective ways to reduce materials and costs.

The new high-tech films protect foods from spoilage, prevent the migration of mineral oils, and can be used in almost all areas of food packing. For example, they offer solutions as a form-fill-seal film in the area of snacks and dry products. +++

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