

# CASE HISTORIES

*Innovate to Compete*



# CASE HISTORIES 1

## Plastic Nord: ethics, design & environment

### BRIEF

#### The design theme: “a box and a friend to the environment”

Plastic Nord benefits from decades of experience in the field of plastic packaging made from post-consumer materials for the fruit and vegetable sector.

Thanks to their passion and the efforts of Giovanni Giantin, founder of Imball Nord and Plastic Nord, they have always been sensitive to issues concerning the reuse and recycling of plastic materials. Together with Gruppo Icat, a communications and marketing agency in Padova, Plastic Nord launched the project “Amico dell’Ambiente” [Friend of the Environment].

The project transformed schools in the surrounding areas into collection points for plastic tops, thereby sensitizing children and, as a consequence, their families to issues of ecology.

Amico dell’Ambiente contacted nursery, elementary and middle schools throughout Italy. Through the collection of certain, specific recyclable plastics these educational institutes could educate their students about ecology while simultaneously earning money to invest in their own activities.

As a matter of fact, the plastic is paid based on its weight once delivered to Imball Nord and subsequently transformed, thus becoming a precious economic resource schools can use in their own projects.

The success of this initiative was so great that in 2011 a total of 147,000 kilos were recycled. To put this in perspective, this is equal to 94 million units of recycled objects, which could fill a 32-car train top to bottom. This amounted to approximately 30,000 Euros in earnings for use by associations and, above all, the participating schools.

Emboldened by this incredible result, Giovanni Giantin and Plastic Nord decided to set out to design a box for fruits and vegetables made entirely from the milling of the recycled tops provided by the local children.

In order to accomplish this task Plastic Nord turned to Parco Scientifico e Tecnologico Galileo and Scuola Italiana Design for the development of this important project.

### RESEARCH

#### The culture of the project: “understanding the supply chain”

During the first week of the project the SID Creactive LAB group, the creative lab and professional studio within Scuola Italiana Design, set a series of research studies in motion in order to better understand the supply chain “from the producer to the consumer”.

The group remained faithful to the idea of starting from an anthropological perspective in terms of project development: subdivide the various targets/end users/customers of the product and understand their strengths and weaknesses, expectations and needs, and their problems and opportunities.

Large-scale distribution centres, producers, shopkeepers, customers; for every profile the young designers of Scuola Italiana Design identified the seed from which to grow and develop initial brainstorming through user-analysis tools.

## CONCEPT

### The initial proposals: “satisfying needs”

The initial proposals set the objective of creating a series of possible design guidelines that would be drastically different from one another in meaning and degree of innovation, so as to allow Plastic Nord to choose where they wanted to position their own level of innovation.

The over 15 initial concepts, which were carried out with 3D modelling and computer rendering, were divided into three large design scenarios, each one with a focus on a specific functional-aesthetic feature.

Specifically:

- Ease of transport/storage of the product
- Value of the product in the display phase
- Sensitize the users by communicating the values of recycling and reuse.

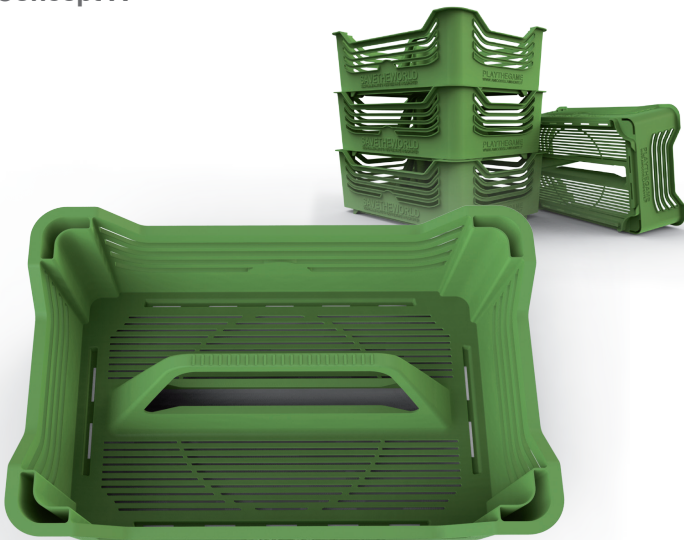
### Here we insert 3 of the 15 concepts with their related captions

**Concept A** - ergonomic focus: concept with a central handle to facilitate the handling of the product.

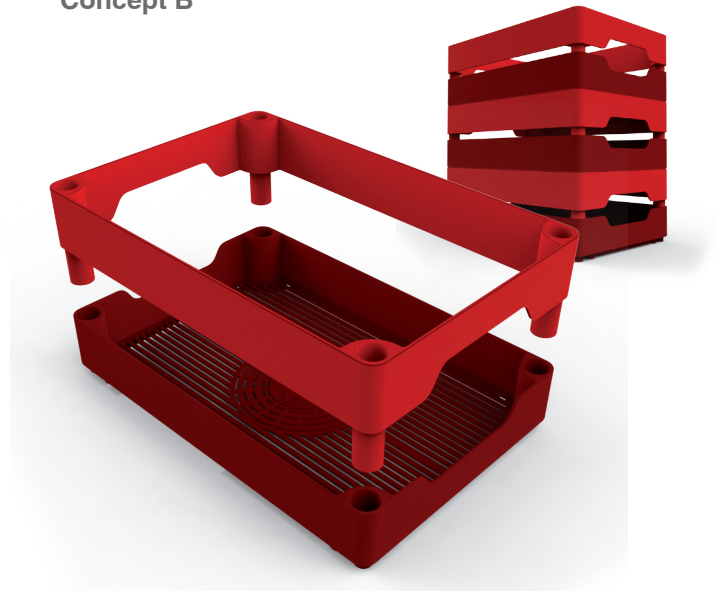
**Concept B** - concept with height-adjustable features with related possibility to exponentially increase available colour variations.

**Concept C** - creation of four different sides in order to create four diverse “visual experiences” according to the point of view in which the box is seen.

Concept A



Concept B



Concept C



## DEVELOPMENT

### “Aesthetics and functionality”

The staff of Plastic Nord decided to develop the central handle concept, which has been used for some time in certain models of boxes and crates for beverages but never utilised for fruit or vegetables (concept transfer).

The designers of SID Creative Lab took great care and attention in finding the right balance between the need to create a series of graphics that would call attention to and communicate the “Amico dell’Ambiente” project and the need to achieve the mathematics capable of favouring the injection flow of the plastic material taken from the recycled tops.

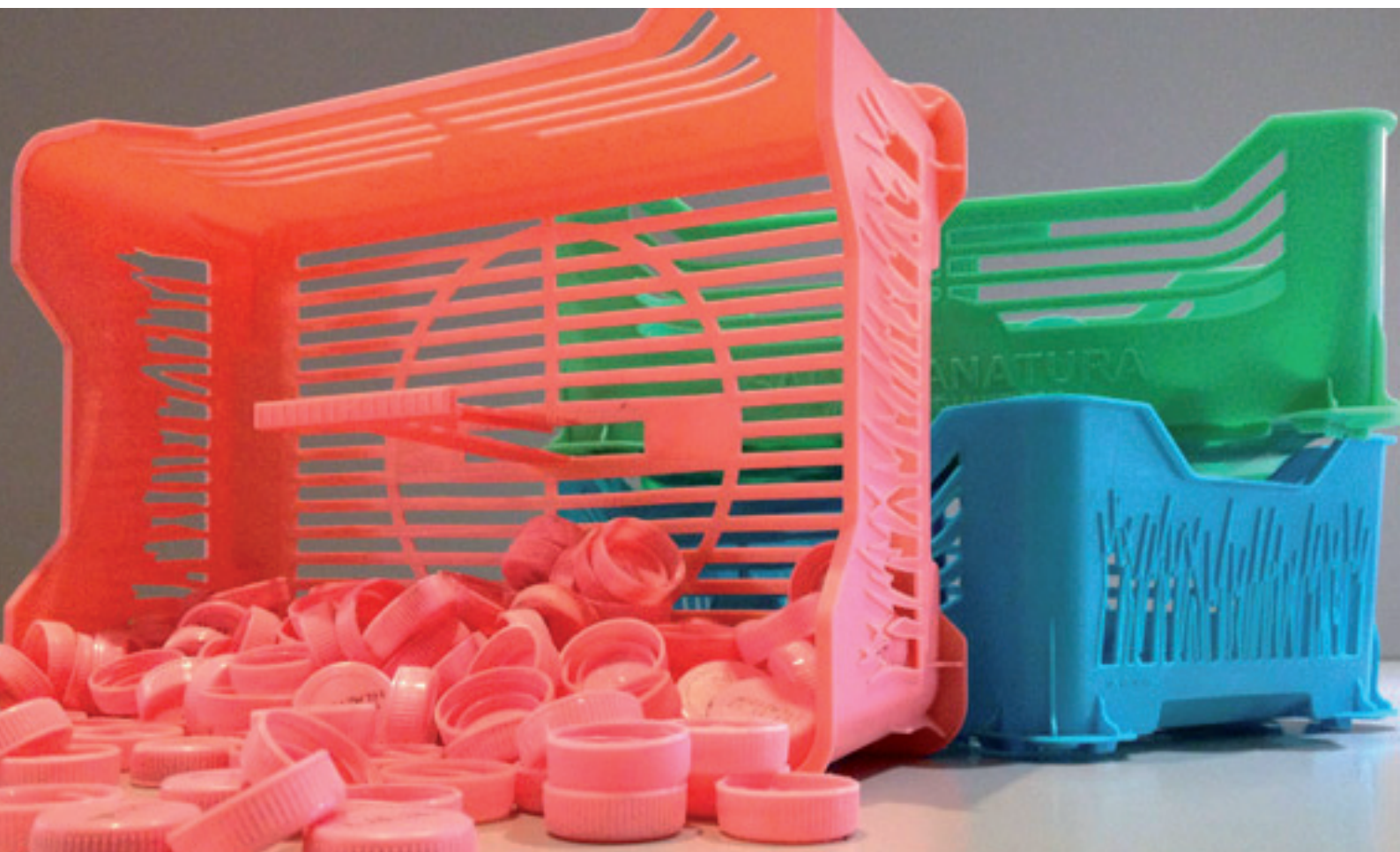
Thanks to the realisation of a number of models carried out through sintering and 3D simulation, it was possible to quickly achieve the chosen model.

## CLOSING

### The end of the project: “a winning combination”

The boxes, which are absolutely unique in Italy for their composition linked entirely to the milling of tops, represents a winning combination of marketing, design, and plastic moulding techniques.

Besides the successful outcome of the final product, what is most important to focus on is how the authors of this extraordinary project, together with local schools, their families, Parco Scientifico Galileo and Scuola Italiana Design have built a virtuous chain that spans different generations which are all linked to a common objective: safeguarding the environment through good design.





# CASE HISTORIES 2

## Mondialforni: beauty, efficiency and modernity

### BRIEF

#### The design theme: “an oven for a new generation”

MondialForni Benini is a company that is situated in Verona which for over 60 years has been the European leader in the field of ovens and baking machines.

Clients in this sector are primarily bakeries and pastry shops, industrial and semi-industrial bakeries as well as those in large-scale distribution centres.

In recent years the world of foodstuff has been undergoing a sort of “rebirth”, which has brought about a veritable explosion of bakeries and pastry shops. As a matter of fact, in 2011 MondialForni enjoyed its highest sales ever recorded.

Moreover, the need to show the client genuine quality has encouraged many businesses to place their ovens on display, therefore reinforcing the message of “fresh out of the oven”.

The marketing team of MondialForni decided to follow this trend by turning to Scuola Italiana Design for the development of a new line of ovens that take three main features into account:

- Aesthetics
- Robustness
- Energy-Saving

### RESEARCH

#### The culture of the project: “opening to other worlds”

Besides the initial market and typological research (the state-of-the-art of the operating sector and competitors), the creative group of Scuola Italiana Design carried out alternative research to find possible aesthetic and functional stimuli in very different sectors from the original one in order to transfer those ideas back to the project.

The goal was to analyse new styles and trends in “other markets” (from automotive to home appliances, consumer electronics to sport systems), examining new studies and concepts within these markets and their potential application in their sectors.

The analysis of the type of users producers target thus established the level of emotional action to apply to their products.

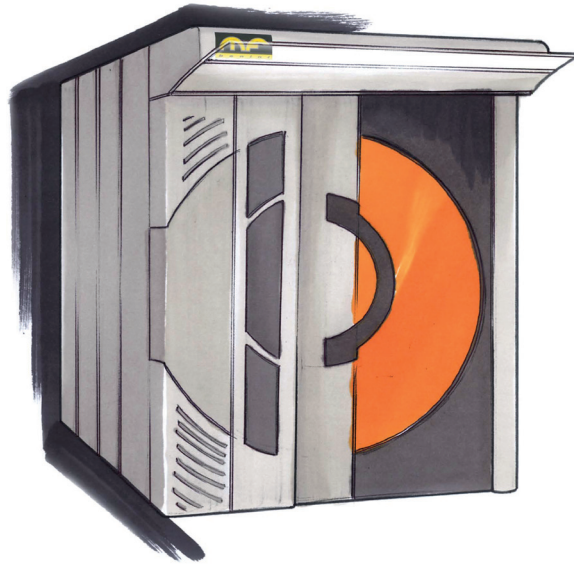


## CONCEPT

### The initial proposals

In contrast to prior models and with the logic of satisfying the needs of a diverse public (buyers, owners and clients of bakeries/pastry shops), the proposed concepts focused on the following points which arose during brainstorming:

- Improving internal visibility of the product through larger windows;
- Guaranteeing more ergonomic handling;
- Simplifying the control panel (visual ergonomics);
- General tone for the personalisation of the company product;
- Adaptations to potential customisation according to the needs of the final client;
- Applied graphics analysis for the highlighting of the company brand.



## DEVELOPMENT

The technical staff of MondialForni was struck by the new layout of the oven and wholeheartedly collaborated with Scuola Italiana Design to engineer everything.

The new large dimension stainless steel handle allows for more solid and ergonomic handling; moreover, closing is facilitated through push movements. The inserts that were designed and used in the restyling represent a way to diversify the models but, more importantly, to create the platform concept for the product: one model, X variations.

A new tube exchanger was also developed that is composed of three smoke flues with the use of tubular elements which optimises its internal and external fluid dynamics. This improves efficiency while simultaneously reducing waste.

Improved seal: Special inox steel gaskets and silicon rubber guarantee long duration, avoid crushing caused by accidental bumping and allow for improved sealing of vapour along the perimeter of the door, thus reducing energy waste.

Constant insulation: A double layer of mats made of rock wool with elevated density (100 kg/m<sup>3</sup>) covers the perimeter of the oven, preventing thermal bridging and guaranteeing maximum thermal insulation and constant temperature. This greatly contributes to higher energy savings.

Maximum efficiency: The new inox steel exchanger guarantees more than 90% improved efficiency, thus allowing for the reduction of waste. Perfect view: Cleaning is simple and quick with the glass door that opens like a book, allowing for a perfect view of the product during baking.

The bulb in the door can be easily removed and replaced. In the following diagram we can see the strengths and improvements of the new line (named Techno) in comparison with previous ones (Plus & Wide)

## MAIN DIFFERENCES / NEW IDEAS

1. New design
2. Insulation uniformity
3. New exchanger
4. New ventilating motor
5. New ventilation grill
6. New door
7. New electrical system
8. New electronic platform
9. New versioning
10. New optionals

## TECHNO vs. PLUS & WIDE

Improved aesthetics (new fan/hood / material dimensions - new door / materials / external coating / materials - inserts)

Waste reduction

Higher efficiency / waste reduction

Reduced bulk

Better uniformity for products with small dimensions

New gaskets / new closing system / new glass and lights / better vapour sealing / improved cleaning / waste reduction

Improved accessibility

Ease-of-use / new functions

Improved sales offerings

Improved use flexibility  
door reversibility left/right / glass door protection / speed dry / inverter

Note: posterior extraction burner is now standard

## CLOSING

### The end of the project: “ADI DESIGN INDEX”

Techno represents a revolutionary line of rotary ovens for baking. Strengthened by the positive qualities which characterise its products, MondialForni enjoyed the growth and consolidation of its position as leader of the European market. In 2010 Techno received honourable mention and was inserted within the ADI Design Index, the publication by the Associazione Italiana per il Disegno Industriale [Italian Association for Industrial Design] which selects the most innovative products in a variety of sectors for their aesthetic-functional qualities and energy saving solutions.

In the end, Techno is the synthesis of a product line that embodies all 5 major trends expressed in Design Thinking: respect for function, ergonomic, technological, ecological involvement, and aesthetic appearance.



# CASE HISTORIES 3

RIRI, luxury fashion: functionality, design and the environment

## BRIEF

**The design theme: “a biodegradable snap fastener”**

The RIRI GROUP is a company leader in the production of zippers and luxury buttons, which also operates in the fashion sector producing jeans buttons, snap fasteners and rivets. Specifically, in the jeans sector, RIRI develops different kinds of buttons in small and large productions for numerous markets.

Their buttons are produced both with metallic materials as well as with polymers, as the company has machinery for sheet working and plastic moulding at their disposal.

The availability of numerous, diverse work processes allows RIRI to operate with great versatility, making them able to offer personalised solutions to their clients; thanks to their talent and the elevated technical training of their staff, over the years they have developed patents with ad hoc solutions to satisfy the specific needs of their clients.

Their attention to the evolution of the market and sensibility toward the environment have pushed RIRI to seek out solutions to reduce the environmental impact of their products. The theme proposed by RIRI was to develop a snap fastener for pillow cases or garments made of biodegradable plastic which guaranteed the same resistance to opening/closing and wash cycles.

The company intended to offer their client a new, aesthetically pleasing product that had the same mechanical characteristics, was workable with the companies machinery, and could be disposed of in a single solution without being needing to divide the button from the rest of the garment at the end of use.

## RESEARCH

**Biodegradable polymer materials capable of injection-moulding**

For the development of the new snap fastener MaTech concentrated their initial attention on identifying the significant technical parameters of the resin utilized by the company (identified through SEM laboratory testing as acetal resin).





Because snap fasteners undergo numerous fatigue cycles due to their opening and closing, and given that during the process of production the fastener is subjected to a strong impact from punching, which is necessary to create the opening used to fix the fastener onto the textile, a number of technical/mechanical parameters were important to consider:

- Elastic form, resistance to flexure and yield, which represent the indicator of the material's rigidity;
- Elongation at break, which represents the indicator for the capacity of deformation of the polymer itself

These parameters represent a necessary indication in order to identify the resistance to punching (in creating the button hole) and the behaviour of the material under fatigue caused by opening and closing cycles.

Research was subsequently carried out into materials that responded to these previously selected technical parameters. Three different types of polymer materials derived from renewable resources and suitable for injection-moulding processes were identified. One material comes from PLA, a polymer whose monomer is extracted from corn, and the other is a polyamide-based extracted from castor oil.

## **CONCEPT**

### **The first proposals**

The three types of biodegradable polymer materials were presented to the company. A comparison was made between the significant technical parameters of the acetal resin and the data sheets of the new materials. The work group then decided to proceed with all three polymer types in the experimentation and testing phase.

## **DEVELOPMENT**

### **First moulding tests**

The technical parameters of injection moulding, such as MFT (Melt Flow Rate) were also critically analysed together with the possible solutions. This was done in order to identify solutions that would also be processable for the machinery used by the company. Therefore, three samplings and three relative moulding tests with three different grade polymers were performed.

The polymers that were identified were: a type of PLA-based biopolymer derived from corn flour; a PLA-based biopolymer derived from cellulose acetate and a type of polyester derived from castor oil. It should be noted that, despite being derived from renewable resources, the polymer derived from castor oil is not biodegradable; yet its environmental impact is reduced in comparison with traditional polymers if final LCA value is considered. Therefore, MaTech and RIRI together decided to keep it in consideration.

The next step included a number of moulding tests with the chosen plastic materials. These tests were performed successfully without the need to modify the mould or the machinery, and thus a number of "button-prototypes" were obtained. Yet, in the next phase only one type of button passed the punching test. This was the biodegradable polymer derived from corn flour; the other types of buttons fractured.

## **CLOSING**

### **Function and appeal**

The processed material, besides having satisfied all demands from a technical point of view, also proved valid from an aesthetic perspective, thanks to the white pearl effect that characterises it.

The potential for mass colouring of the polymer was also demonstrated. In the end, there was a final effort to improve performance and appeal to its utmost, thanks to a redesign of the male/female closure, which the company carried out autonomously in-house with the goal of maximizing product performance.

# CASE HISTORIES 4

**Mirage eyewear: sport and outdoor life in harmony with the environment:  
“ a green way to be”**

## BRIEF

**The design theme: “an organic frame”**

Mirage Eyewear is a dynamic Italian company that operates in the eyeglasses sector, producing frames through an injection moulding process.

They aim specifically toward the American market and to a young and athletic audience who are particular in tune with fashion and new trends. Surfers, in particular, are an extremely demanding customer base; their great passion for the sea and the nature of their sport makes these athletes particularly sensitive to comfort and environmental concerns.

Historically, the most well-established material in eyewear for the production of frames is Grilamid TR90, a polymer with excellent mechanical and thermal performance. Up till now in eyewear no experience has been carried out in the area of “green”, non-petroleum derived polymer materials.

The goal of this company was to introduce a new product in the market in response to this: the first eyeglasses obtained from renewable sources, the first ecologically sustainable eyeglasses for water-sports athletes.

It was a highly ambitious project, considering that in 2008, when the project was developed, the offers of high-performance ecological plastics on the international market were limited.

## RESEARCH

**Polymer materials from renewable resource alternatives to GRILAMID TR90**

The research conducted by the technical group from MaTech was carried out by selecting different types of polymers derived from renewable resources such as castor oil, soy, and corn flour.

Their relative technical charts were then compared, considering the polymer grades which possessed qualities of mechanical and thermal resistance so commonly used in the eyeglass and sporting goods sector.

Qualities such as resistance to thermal shock, impact and scratching are necessary as they are the conditions to which athletic eyewear is generally exposed.

## CONCEPT

**First proposals of ecological polymers for frame**

Starting from the remarks discussed above, all polymers derived from biodegradable and/or compostable renewable resources were excluded as they are characterised by insufficient mechanical and temperature resistances for application in eyewear.

Concentration was then focused on high-tech polymer products with more elevated technical performance. Although they are not biodegradable, these products are partially or completely natural.

In terms of biopolymers, therefore, research identified four main material producers: two manufactures of polyamide derived from castor oil, one producer of a PLA-based polymer derived from corn and a polymer producer called polyacrylate.

## DEVELOPMENT

### Moulding and mechanical/thermal tests

Once the biopolymers were identified, a number of specific samplings of plastic grains were begun and the related moulding tests were performed; the grade of polyamide biopolymer extracted from castor oil proved superior to the others as it demonstrated excellent processability.

Prototype eyeglasses were then developed and mechanical and thermal tests performed. The frame was subjected to tumble finishing cycles, which are often done together with the consequent finishing of the prototype.

In the end, the final product also proved to be varnishable, affordable, and comparable to similar products that are manufactured with traditional materials.

## CLOSING

### The first ecological eyeglasses

Following the project carried out by MaTech, Mirage designed the packaging support for the eyeglasses, made entirely of natural materials: the pouch is 100% organic cotton and the box is recycled paperboard. In this way, the consumer is made aware in numerous ways of the company's efforts to reduce CO2 in the environment.

The project concluded with an excellent market communication strategy about the new product, thanks in part to a celebrity endorsement: Rob Machado, famous surfer, world champion in his speciality and great supporter of environmental issues.



# CASE HISTORIES 5

## Danplast: the shopping bag that does not pollute

### BRIEF

#### The design theme: “100% biodegradable bag”

Danplast is an Italian company that produces packaging for the industrial sector, waste bags and commercial shopping backs made from polyethylene extrusion.

Danplast turned to MaTech in view of upcoming norms to eliminate polyethylene from the production of shopping bags. Danplast expressed an interest in the area of extrudable, biodegradable substitutes for polyethylene with comparable mechanical characteristics to material that is currently used.

They were also interested in the use of inks and water-based and/or natural colours to apply to biodegradable materials in order to substitute solvent-based colours which are commonly used.

### RESEARCH

#### Substitute biodegradable materials for polyethylene

The decisive, central focus of the project foresaw research into the identification of new materials and technological solutions for the production of biodegradable commercial shopping bags.

Concerning the polymers to be used in order to obtain a product that conformed to European norms it was necessary to consider the following:

- biodegradability;
- disintegrate ability;
- absence of negative effects on the composting process;
- low levels of heavy metals;
- other chemical-physical parameters that must not differ from the control compost after biodegradation (for example, pH, saline content, solid volatility, nitrogen, phosphorous, magnesium, potassium);

Moreover, research has also considered the identification and choice of manufacturers of inks or colours for water-based and/or natural printing.

These would replace solvent-based colours which had to be applied on biodegradable extruded film.

Specifically, this research phase involves a number of steps: broad research conducted using MaTech's research tool, and visits and encounters with material manufacturers and distributors in order to identify the best solutions for the proposed case. Contacts were also set up with potential material suppliers in order to begin recovering a demonstrative sampling.



## CONCEPT

### Identification of biodegradable polymer and ink

In this phase the most suitable material considered was identified, both in terms of the availability of the raw material as well as its effective correspondence to the requirements of the European norms in force concerning biodegradability and compostability (EN13432).

The polymer that was chosen is PLA-based and derived from corn. It is suitable for injection moulding processes as well as extrusion processes and has obtained European certification EN13432 for biodegradable and compostable raw materials. The producer is European with a sales representative for Italy: this aspect was also considered in the choice of producers, given the improved delivery times in contrast to producers outside of Europe.

## DEVELOPMENT

A number of specific samplings of polymer grains of the material were initiated together with extrusion tests performed at Danplast's facilities due to the necessity to utilize their equipment.

No specific modifications to their equipment or systems were necessary, only a recalibration of process parameters such as temperature and extrusion velocity.

## CLOSING

After having successfully carried out extrusion tests on the material, specific tests for colour printing with natural inks were performed. In this case, it was necessary to have adequate graphic design planning so as to achieve the right balance of the various colour tones in order to obtain a percentage of metal that did not exceed those allowed for by European norms for compostability.

The printing of the product, too, was achieved with high-quality results. Today the shopping bag is available on the market, fostering a more ecologically sustainable shopping experience.



