



Exceed™ Stiff+

Exxtra™ Seal

Creating high-performance, downgauged, recyclable*, non-laminated freezer film with brand appeal

A collaboration between Bonduelle, ExxonMobil and Constantia Drukpol

Bonduelle started as a French family business in 1853 and has now grown to over 11,000 employees with their ready-to-use plant-based products grown on 68,000 hectares of land and marketed in 100 countries. Their goal is to make a positive impact that inspires the transition toward a plant-based diet to contribute to people's well-being and a healthy planet.

Bonduelle plans to contribute to a circular economy, targeting that 100% of its packaging is designed for recyclability* or reusable by 2025.



Recyclable* packaging



Brand promotion / appeal



Downgauging potential

Challenge

An ExxonMobil study on freezer films carried out across Europe showed that approximately 50% of the market consists of polyethylene coextruded (PE CoEx) multi-layer films and the other half of laminated films. Most of these laminated films are multi-material and as a result, can be a challenge to recycle.

Frozen food films can have demanding requirements such as: excellent sealability, mechanical strength, moisture and odor barrier, low temperature bagdrop resistance and excellent appearance. An oxygen barrier is not required as the food is kept at sufficiently low temperatures. Bonduelle wanted to switch from complex laminated metallized freezer films to coextruded unlaminated mono-material PE film to improve potential recyclability* and simplify its portfolio.

Frozen food is usually packed on a VFFS (vertical form film and seal) line at high speeds. After packing, the frozen food bags are transported by a conveyor belt and dropped into a carton box from a certain height. For some frozen foods (for example vegetables with hard corners) the packaging process can be very harsh and maintaining bag integrity is a key film/packaging requirement. So key performance criteria of the film include stiffness, toughness and puncture resistance.

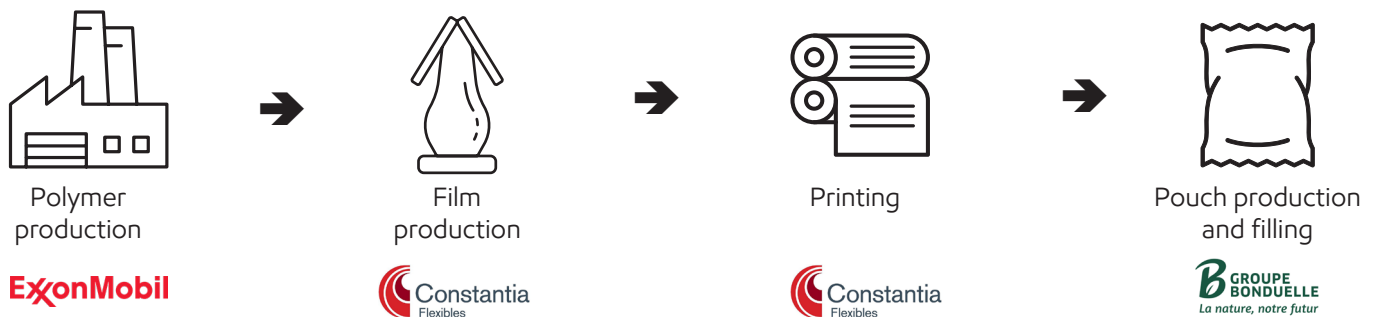
*Recyclable in the few communities with programs and facilities in place that collect and recycle plastic film

Solution

When evaluating Bonduelle's packaging needs it was determined that most of the range are for "easy to pack" vegetables like peas or green beans — these can be packed in standard film. The rest of the range is "challenging to pack" vegetables like spinach and broccoli — this was the focus of the project.

ExxonMobil, one of the largest PE resin suppliers, and Bonduelle Group collaborated with Constantia Drukpol, a leading polyethylene film converter, to design a new, easier-to-recycle packaging bag.

"For our retail Frozen Bag Category, we wanted to replace our historical multi-material metallized film since it was difficult to recycle. We selected a mono-material PE solution without adhesives so it can be easier to recycle* compared to multi-material solutions. We faced many challenges during the development process but managed to overcome them due to the technical expertise of Constantia Drukpol and ExxonMobil." said Mr. Arnaud WARUSFEL, Packaging Development Manager at Bonduelle Europe Long Life.



Constantia Drukpol was chosen for its strong printing expertise and experience in blown coextrusion film, lamination, laser cutting, and pouch-making.

ExxonMobil was chosen for its excellent technical expertise and high performing resin portfolio and proposed:

- Exceed™ Stiff+ performance polyethylene for excellent stiffness and toughness while using less material
- Exxtra™ Seal m 1012 performance polyethylene for strong sealing performance, outstanding cold temperature toughness and puncture resistance

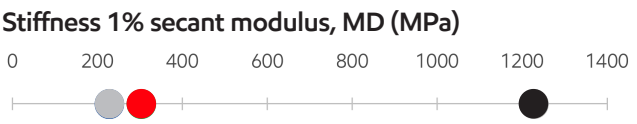
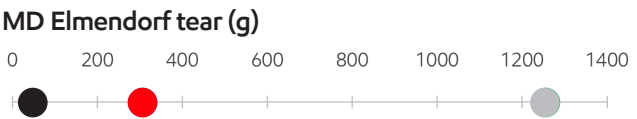
Results

In the lab, the reinforced solution for "challenging to pack" vegetables achieved higher needle puncture and higher tear than the solution for "easy to pack" vegetables. This convinced Bonduelle to test the film in their factory.

Ultimately, Bonduelle chose a formulation based on a packaging trial on their VFFS packaging line, where they were satisfied with the abrasion resistance and VFFS line speed that the solution could offer.

Creating packaging designed for recyclability is helping Bonduelle to meet its packaging goals while simplifying its portfolio. The new solution meets performance criteria and can use less packaging than previous solutions due to downgauging. The company estimates it saved up to 25% in plastic for its frozen natural range in France (as assessed in January 2023 as compared to October 2020).

*Recyclable in the few communities with programs and facilities in place that collect and recycle plastic film



	Bonduelle - triplex laminated film 2021	"Easy to pack" non- laminated film 2023	"Challenging to pack" non- laminated PE film 2023, reinforced
Thickness*	82 micron	60 micron	70 micron
Structure	OPP//PET metallized//PE	CoEx PE	CoEx PE

*Thickness measured by ExxonMobil.
Test methods: Needle puncture and tensile based on ExxonMobil method. Tear based on AS*-1922. Data traceability: R2112-005716 (B2112-000031146), R2209-009376 (B2209-000088384, B2209-000088385) and R2202-006132 (B2202-000033616)

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What’s new: ExxonMobil Signature Polymers

All our polymers are now positioned under a single portfolio brand: Signature Polymers. The aim is to simplify our product architecture and naming to improve portfolio navigation for you. We would like to stress that our commitment to high quality products remains the same, it is the names that change. Everything else remains the same. We will be making these modifications over the next six months so you will see both old and new grade names highlighted during that time.

Here’s a quick overview of brands and grade names that have changed in this document:

Legacy commercial name	New commercial name
Exceed™ 1012	Exxtra™ Seal m 1012
Exceed™ S	Exceed™ Stiff+

Some of our existing Exceed, Achieve, Paxon and premium PP/HD grades have moved to Exceed brand; most existing Enable grades have moved to Exceed Flow[+]; most of our existing Exceed XP grades have moved to Exceed Tough[+]; most of our existing Exceed S grades have moved to Exceed Stiff[+]. More details here https://www.exxonmobilchemical.com/en/brands/signature-polymers/exceed_high_performance_polymers or contact your ExxonMobil representative to know more.

Want to see what’s changed in our portfolio? Go to [exxonmobilchemical.com/sptransform](https://www.exxonmobilchemical.com/sptransform)