ExxonMobil Signature Polymers

Case study

Exceed™ Stiff+ Exceed™ Flow+ Exceed™ HD Exceed™ Exxtra™ Seal ExxonMobil™ LD

Reimagining cheese packaging through collaboration: designed for recyclability*, mono-material HFFS pouch with a 60% material reduction**

Designed for recyclability* | Downgauging opportunity** | Good optical properties | High oxygen barrier

Data and results presented herein apply specifically to the noted application under this case study.
Your results may differ depending on factors such as operating conditions, equipment and materials used.

Challenge

Create a cheese packaging solution that is designed for recyclability* and uses significantly less packaging material compared to traditional rigid thermoformed tray solutions.

In response to growing demands and evolving regulations, such as the European Packaging and Packaging Waste Regulation (PPWR)[1], we took the challenge to replace conventional multi-material cheese packaging — typically rigid trays with lid films — with a mono-material PE pouch that is thinner, designed for recyclability*, can provide the same shelf-life as existing cheese packaging and runs efficiently on horizontal form, fill & seal (HFFS) pouch-forming lines.

[1] https://eur-lex.europa.eu/eli/reg/2025/40/oj

Solution

Polymer providers → Blown film extrusion & inline MDO → Printing → Lamination → Pouch production (forming, filling and sealing)

Polymer providers: ExxonMobil Signature Polymers; kuraray; EVAL

Blown film extrusion & inline MDO: HOSOKAWA ALPINE

Printing and lamination services were provided by a 3rd party

Pouch production (forming, filling and sealing): IMA ILAPAK Flexible Packaging Solutions

* Designed with features intended to support recyclability. Actual recyclability depends on factors such as local collection, sortation, and recycling infrastructure, as well as the condition and configuration of the package after use. However, access to facilities that accept, and process plastic film is limited and not widely available.

** as compared to conventional thermoformed tray packages

IMA ILAPAK Flexible Packaging Solutions | kuraray | HOSOKAWA ALPINE

Alpine's latest 9-layer barrier blown film line, equipped with inline machine direction orientation (MDO) technology utilizing the vacuum system for ensuring excellent film processability, offers enhanced flexibility for film extrusion. On this single line, ExxonMobil Signature Polymers resins were used to produce both the MDO PE barrier substrate and the PE sealant film.

Thanks to Alpine's advanced die head geometry and MDO capabilities, an ultra-thin 2 micron barrier layer was achieved using EVAL™ LT172B - a low ethylene EVOH grade suitable for orientation. This thin layer delivers strong barrier performance, supporting food shelf life.

The MDO PE barrier substrate film was reverse printed and laminated to the PE sealant film. The following high-performance resins were used:

MDO PE substrate film:

- Exceed™ HD 6107 – designed for flawless processing in MDO applications
- Exceed™ Stiff+ m 0238.RA and Exceed™ Flow+ m 0938.RA - contributed to stiffness, mechanical properties and tailored processability
- Exceed Stiff+ m 0820.RL - enhanced overall process stability and performance of the film

Sealant film:

- Exxtra™ Seal POP 2008.RK – robust bag-forming thanks to low seal initiation temperature (SIT) and hermetic sealing
- Exceed Stiff+ m 0820.RL – contributed to stiffness / toughness balance
- Exceed™ m 2018.RA – good processability as lamination layer resin
- ExxonMobil™ HD 6207FL – for stiffness modification
- ExxonMobil™ LD 07523.AC – enhanced processing stability

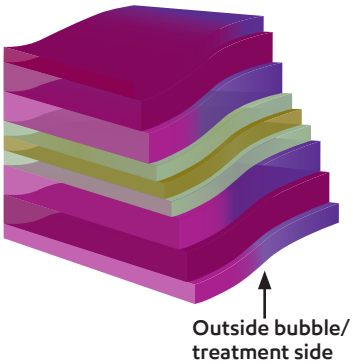
The laminate film was converted into pouches on IMA Ilapak's HFFS machine, engineered to handle both conventional polyester substrates and mono-material packaging solutions supporting next-generation packaging solutions. "At IMA Ilapak, we have extensive experience in correlation of lab analyses and field testing of a wide range of packaging materials, and we are committed to ensuring they run efficiently on our machines - leveraging innovative technologies whenever needed" said Davide Paltrinieri, Group Lab Materials Technologist at IMA Ilapak. "Using this tailor-made, high-performance MDO PE laminate, we successfully achieved hermetic sealing at speeds of up to 130 packs per minute on a long-dwell machine with optimized heat-sealing profiles."

This collaboration between industry experts resulted in a solution that is not only easily extruded and converted, but also designed for recyclability*. Its versatility makes it suitable for a variety of food applications beyond cheese packaging.

MDO barrier substrate

Thickness: 25 µm

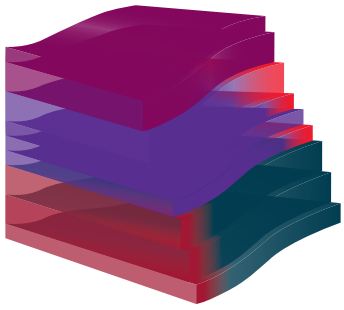
- Exceed™ HD 6107
- Exceed™ Flow+ m 0938.RA
- Exceed™ Stiff+ m 0238.RA
- Exceed™ Stiff+ m 0820.RL
- EVAL™ LT172B
- Tie Admer™ AT1995E



Sealant film

Thickness: 45 µm

- Exceed™ m 2018.RA
- Exceed™ Stiff+ m 0820.RL
- ExxonMobil™ HD 6207FL
- ExxonMobil™ LD 07523.AC
- Exxtra™ Seal POP 2008.RK



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Results

The mono-material HFFS cheese package provides the following benefits:

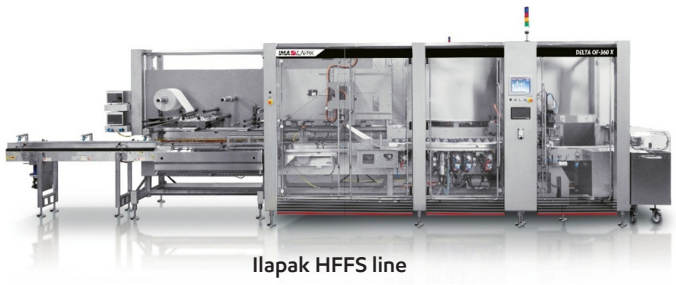
Weight reduction: Over 60% weight savings compared to rigid thermoformed trays.

Design for recyclability*: Comprising > 90% PE, the package can meet design-for-recyclability criteria by keeping the EVOH barrier layer below the 5% threshold.[2]

Oxygen barrier: MDO technology enhances the efficiency of the ultra-thin EVAL™ EVOH layer (2 micron). Oxygen transmission rate (OTR): < 0.5 cc/m^2 x day — suitable for a typical cheese package.

Hermetic seal and processing: Reliable performance on a full-scale HFFS packaging line, achieving consistent hermetic sealing and smooth machine conversion.

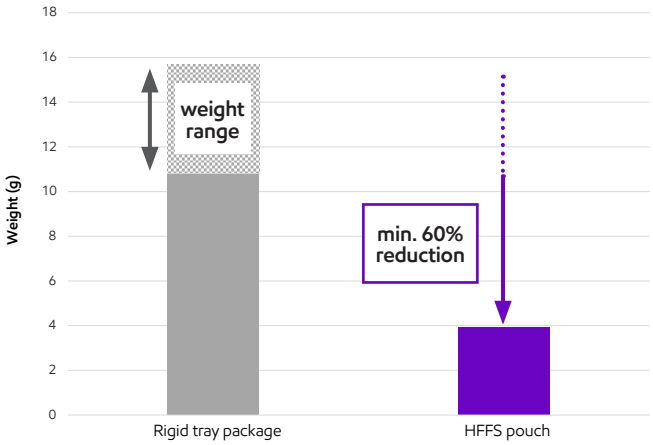
Optical properties: Low haze and good product visibility from all sides, enhancing shelf appeal for consumers. Total haze = 6.9% for the MDO PE substrate film.



Ilapak HFFS line

Alpine MDO line

Weight comparison between rigid and HFFS pouch



[2]https://tool.recyclass.eu/en/ (May 6, 2025)

Property	Test method based on
Weight	ExxonMobil method
Oxygen transmission rate	ASTM F1927 (measured at 23°C, 50% relative humidity of the test gas)
Total haze	ASTM D-1003-A

Data from tests performed by or on behalf of ExxonMobil. 2025-RTI-4942

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ExxonMobil Signature Polymers

Bring your impossible

ExxonMobil Signature Polymers was born from the belief that people fuel progress. From automotive and construction to packaging, agriculture, industrial, and beyond, we leverage the scale and reach of ExxonMobil to deliver the insights and innovations that empower our diverse, global partners to take their businesses to new heights. We continuously work to provide the listen-first, service-driven, game-changing collaboration that unlocks opportunities for our partners and advances their business goals.

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