ExxonMobil
Signature Polymers

Case study

Exceed™ Exceed™ Flow Vistamaxx™

Ergis, Windmöller & Hölscher, ESTL and ExxonMobil Signature Polymers collaborate to develop an innovative 8 µm HTPS film incorporating 35% PCR content

Incorporates 35% PCR content

High speed wrapping

Consistent tenacity

Holding force and load stability

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

Evolving regulations, such as the Packaging and Packaging Waste Regulation (PPWR)[1], when in force, will impose certain minimum percentages of recycled content in certain types of packaging. Brand owners' demand for post-consumer recycled content (PCR) incorporation in tertiary packaging film, to meet some of their sustainability commitments, creates some challenges:

- Achieving a stable extrusion process
- Obtaining consistent stretch film performance
- Maintaining high-speed wrapping capabilities (up to 50 rpm)
- Ensuring load stability with ultra-thin film (8 micron)
- Proving containment force per kilogram of film used around the pallet

"The industry needed a solution that could meet these regulatory and operational demands while supporting circularity and sustainability goals," said Greg Kedzierski, Managing Director at Ergis, advanced films producer in Poland.

"Expertise and partnership was required for success. Over the years, we have collaborated extensively with stakeholders across the value chain to explore the integration of PCR into stretch films and to define the operational boundaries of its use. Despite progress, the high-performance machine wrap segment, characterized by elevated stretch ratios and the use of performance polyethylene, remained a critical bottleneck. The incorporation of PCR often led to premature film breakage during high-speed application, resulting in reduced productivity and increased material consumption for end-users." shared Bart Lauwers, Principal Customer Application Development, Europe, Industrial Packaging, at ExxonMobil.

Solution

A collaborative effort between ExxonMobil Signature Polymers, Ergis, Windmöller & Hölscher and ESTL addressed this challenge with the development of a high tenacity power stretch (HTPS) film, a novel film concept incorporating 35% PCR, typically utilized at 50% pre-stretch, enabled by Exceed™ Flow and Vistamaxx™ performance polymers (patent pending). ExxonMobil Signature Polymers HTPS film structure meets this requirement. This HTPS solution proves that PCR containing films can match virgin power pre-stretch (PPS) film performance in demanding applications.

This advanced 7-layer cast stretch film enables high-speed wrapping at low stretch levels, while maintaining load containment forces comparable to thicker gauge virgin PPS films at similar stretch film usage.

estl ERGIS WINDMÖLLER & HÖLSCHER

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

To ensure a more consistent and reliable high-speed wrapping process, it is essential to produce machine rolls with state-of-the-art winding technology that includes patented bleed less folded edge technology. This technology eliminates the need for bleed trims and significantly reduces the risk of film breakage.

"When slitting films that contain PCR, edge notches can be formed, posing a risk of film tearing under tension. By folding the film edges, we effectively minimize this risk, ensuring smoother performance and greater durability during wrapping," said David Finnemore, Senior Technical Consultant at Windmöller & Hölscher.

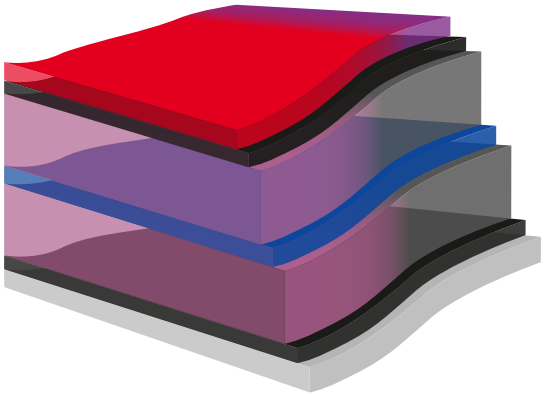
"Consistent film quality is essential for getting the best out of a high-speed wrapping machine. By limiting the pre-stretch to 50% and using ultra-thin film, we've found a way to keep operations running smoothly and efficiently," said Jelle Dendauw, Managing Director at ESTL. In parallel, the ExxonMobil Signature Polymers team engaged with high speed equipment manufacturers to identify and implement necessary adaptations to wrapping machinery, as an HTPS film needs lower pre-stretch and positive 2nd stretch percentage to create the containment force.

To validate the concept at ESTL, an acceleration test was conducted at 0.4 g in accordance with EUMOS 40509 standards. At comparable film weight, our innovative 8 µm HTPS film incorporating 35% PCR and wrapped under HTPS conditions (+10% 2nd stretch) at 50% pre-stretch, matched the performance of a traditional PPS film pre-stretched to 250% under standard PPS conditions (-5% 2nd stretch).

This breakthrough shows that HTPS, incorporating 35% PCR, is a capable alternative to PPS films without PCR used in high-speed wrapping process. It delivers equivalent load stability and no compromise in film consumption, while supporting a more circular economy for plastics.

HTPS film
Thickness: 8 µm

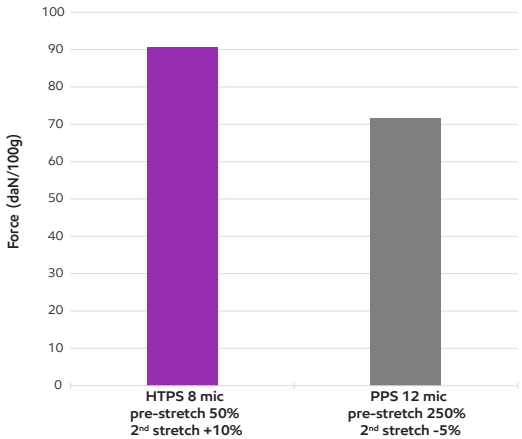
- ExxonMobil™ C4LL 2818
- Exceed™ Stiff m 3527
- Exceed™ Flow m 1716
- PCR content
- Vistamaxx™ 6000
- Customer recipe
- Cling customer recipe



Results

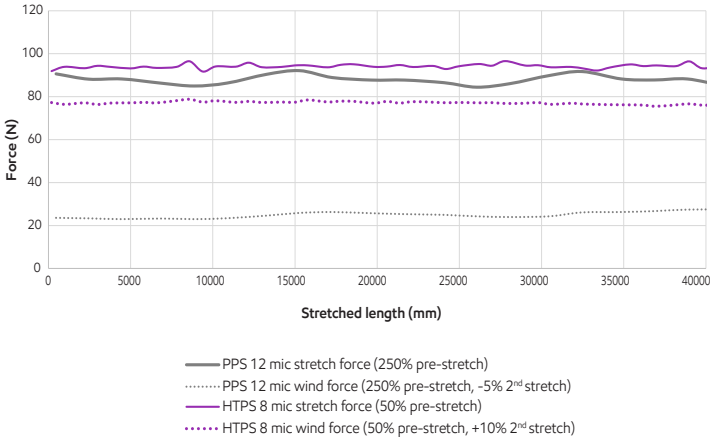
- 35% PCR meets PPWR 2030 requirement for plastic packaging
- High-speed wrapping up to 50 rpm with no loss in efficiency.
- Thin film performance (8-10 microns)
- Folded edges to eliminate film breaks for consistent wrapping
- Load stability maintained – no compromise on containment force
- PCR containing films can perform like films without PCR

FEF-200 corner force (daN/100 g film)



Holding force comparison for a standard PPS 100 % virgin film versus HTPS + 35%PCR at different pre-stretch and 2nd stretch (FEF Film Edge Force)

FPT-consistency test, PPS vs HTPS and corresponded wrapping conditions



FPT-consistency test shows similar stretch force but much higher wind force when working with a positive 2nd stretch %. (FPT Film Performance Tester)

Key materials

Exceed™ Flow m 1716.PA	Easy processing and stiffness; enables PCR content incorporation
Vistamaxx™ 6000	Boosts consistency and stretchability at high speeds
ExxonMobil™ C4LL 2818 / Exceed™ Stiff m 3527	Anti-cling layer formulation
PCR content	Majority LLDPE-based

Processing

- **Cast extrusion** on W&H's 7-layer line
- **High-speed wrapping** trials conducted at ESTL
- **FEF-200** corner force measurement

Property tested	Test method based on
FPT-consitency unwinding force 30N, speed 4m/s, W-pattern, wind strain HTPS +10%, PPS -5%	ExxonMobil method
FEF-200 Corner force (daN/100 g)	ExxonMobil method

Data from tests performed by or on behalf of ExxonMobil.

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.