








Exceed™ Exceed™ Flow Vistamaxx™

Malpack uses ExxonMobil's Exceed™ Flow m 1716 metallocene polymer-based formulation to create high-tenacity power pre-stretch film

 High tenacity	 Excellent stretchability	 High holding force	 High load stability at any pre-stretch level	 Easy processing
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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

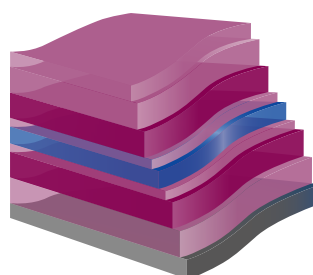
Creating high-tenacity film with high holding force and load stability at any pre-stretch level

Stretch film is used for pallet wrapping and load bundling to protect products from dust, moisture, pilferage, and shifting during transportation and storage, while not obscuring product visibility. High performance stretch wrap can help significantly reduce the risk of damage in transit.

ExxonMobil collaborated with Malpack, a leading packaging company based in Canada with more than 40 years of experience in the conversion, extrusion, and manufacturing of films, suggesting new ways Malpack could incorporate ExxonMobil's performance polymers into Malpack's formulations. From there, Malpack was able to develop and produce its new stretch film that has high tenacity, high holding force and load stability at any pre-stretch level.

Solution

High-tenacity resins typically exhibit low melt index (MI), they flow relatively poorly thereby limiting extrusion rates, and are often blended to reach acceptable flow properties. In this particular application, Exceed™ Flow m 1716 metallocene PE was used in discrete layers (i.e., no blending) to make a nine-layer power pre-stretched film on a wide extrusion line (nine-up) at a high extrusion rate, with great flow all the way to the edges of the die (more than five meters wide). The polymer has excellent processability while maintaining high-tenacity attributes. Head pressure, motor load and melt temperature were marginally affected as compared to Exceed™ m 3518 metallocene PE extruded at the same conditions.



12 µm high-tenacity PPS film

- Exceed Flow m 1716
- Exceed m 3518.CB
- Vistamaxx™ 6000
- Vistamaxx™ 6102
- C8 PE

Adding Exceed™ Flow m 1716 metallocene polyethylene to the power pre-stretch film formulation resulted in a “positive slope” in the tensile curve in place of the plateau. This translates into higher film performance:

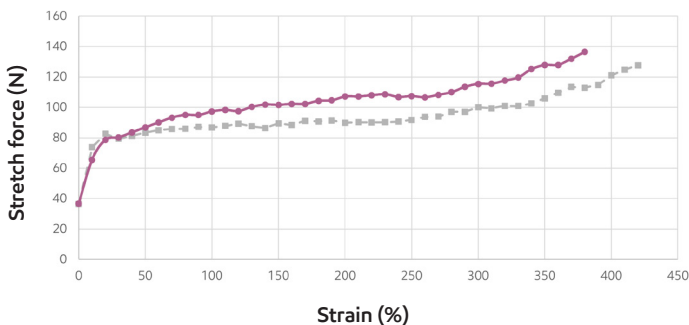
- Higher holding force than traditional power pre-stretch film
- Higher load stability due to increasing stretch force at any stretch level
- Higher reliability/no need to optimize film wrapping, giving a “universal” film property:
 - Holding force is high at any pre-stretch level
 - Stretch force will increase while increasing strain at any pre-stretch level, resulting in great load stability at any pre-stretch level
 - Film wrapping does not need optimization near natural draw rate (NDR) pre-stretch

Results

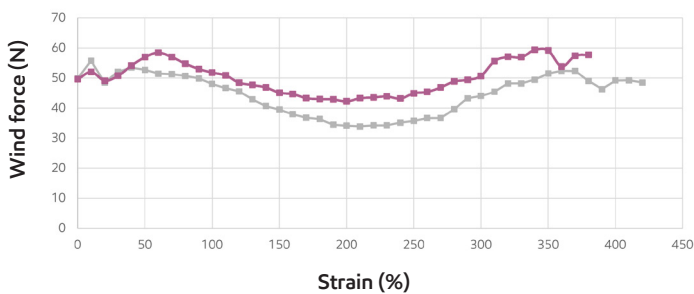
The Exceed performance polyethylene-based solution delivers improved tenacity for improved load stability and higher holding force. Exceed Flow m 1716 combines the two key seemingly opposite features—high flow and high tenacity. This unique combination resulted in great cast film processing, exhibited by faster line speed, lower pressure and lower motor load when compared to incumbent high-tenacity grades. The balanced properties gave opportunity for thinner gauge film and consistent extrusion, which is one of the most important stretch film qualities.

- Start-up and ramp-ups have shown great stability
- High holding force combined with great extensibility
- High reliability with excellent toughness and load stability at any pre-stretch level
- Wrapping optimization not required due to the tensile properties
- Great stretchability/extensibility with excellent elongation and force
- Significant potential unit cost reduction through downgauging
- Improved film optics for easy bar code reading

FPT Ultimate tensile curves (12 µm PPS film)



■ Reference PPS film (B2306-000116788)
■ Exceed Flow m 1716, Exceed™ m 3518 PPS film (B2306-000116794)



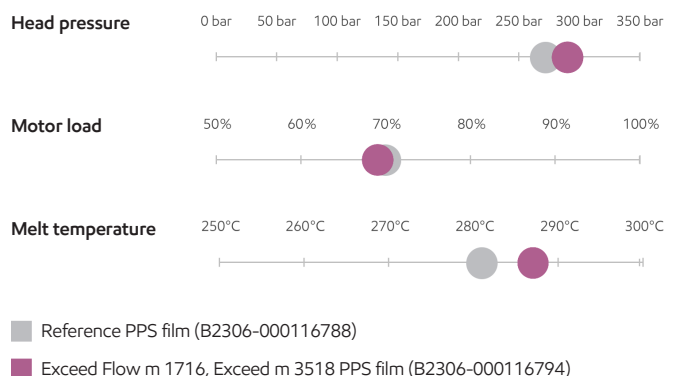
Data	FPT Ultimate curves
Test method	FPT EVO (Calibration date: 2023-02-27 16:43:42)
Unwind tension	30N, Wind strain -4%
Configuration	W pattern
Line velocity	4000 mm/s

Processability

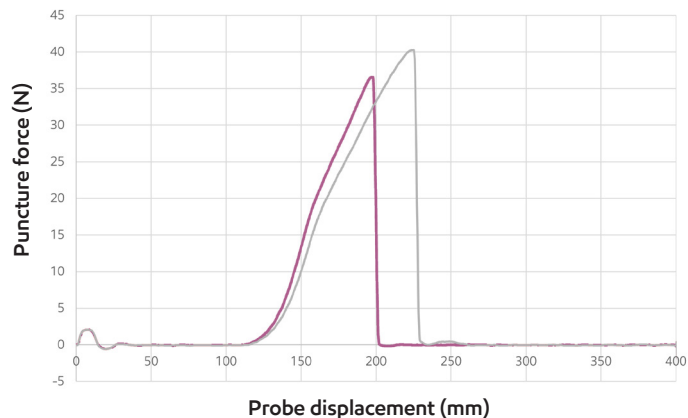
Exceed Flow m 1716 processes similarly to Exceed m 3518 despite a lower MI. It can also be processed as a discrete layer, contrary to other high-tenacity grades, and flows well to the edges (roll-to-roll consistency on wide lines). Exceed Flow m 1716 is easier to process versus Exceed™ Flow m 1020, which typically requires blending to process and can have issues flowing to the edges in wide applications.

Data	Processability
Extrusion system	Windmüller & Hölscher Filmex at Malpack
Film width	4.5 meter (finished)
Line speed	500 m/min

Processing parameters

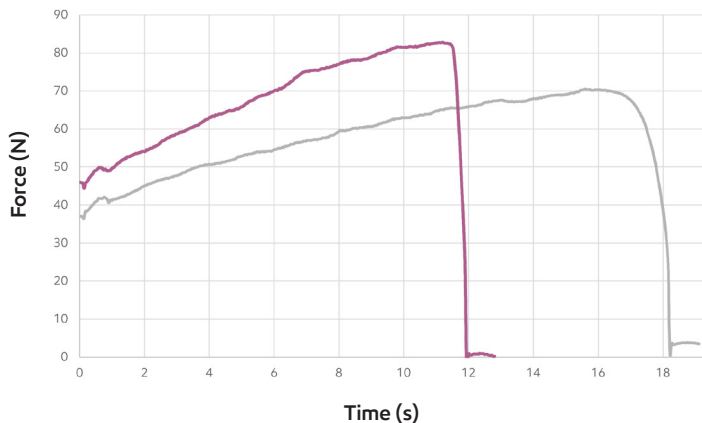


FPT Puncture at 250%, dart probe (12 µm PPS film)



- Reference PPS film (B2306-000116788)
- Exceed[®] Flow m 1716, Exceed[®] m 3518 PPS film (B2306-000116794)

FPT Tear propagation 250% (12 µm PPS film)



- Reference PPS film (B2306-000116788)
- Exceed[®] Flow m 1716, Exceed[®] m 3518 PPS film (B2306-000116794)

Data	FPT Puncture test
Test method	FPT EVO (Calibration date: 2023-02-27 16:43:42)
Unwind tension	30N, Wind strain -2%
Configuration	W pattern, dart probe
Pre-stretch	250%
Puncture speed	500 mm/s
Temperature	24.9°C; Humidity 52.4%

Data	FPT Propagation test
Test method	FPT EVO (Calibration date: 2023-02-27 16:43:42)
Unwind tension	30N, Wind strain -2%
Configuration	W pattern
Line velocity	1000 mm/s
Pre-stretch	250%
Puncture speed	500 mm/s
Temperature	24.9°C; Humidity 52.4%

Signature Polymers from ExxonMobil Product Solutions can help to protect and preserve products with extremely damage-resistant stretch packaging films that can withstand the most demanding stresses, helping brand owners protect their goods through the value chain. High performance stretch films help deliver safety, load stability and cost savings.

Contact us for more information: [exxonmobilchemical.com/sp](https://www.exxonmobilchemical.com/sp)

ExxonMobil

Signature Polymers

Bring your impossible



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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
Enable™ 1617	Exceed™ Flow m 1716
Exceed™ 3518	Exceed™ m 3518
Enable™ 2010	Exceed™ Flow m 1020

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)