ExxonMobil
Signature Polymers

Case study



Exceed™ Stiff+ Exceed™ Flow ExxonMobil™ HD

MDO film solution with high stiffness and optics combined with moderate stretch ratio

Easy processing | High stiffness | Optical properties

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

Development of an easy processing mono-material PE film formulation that has the potential to replace non-PE substrates.

Multi-material laminates are widely used to meet packaging film functionality requirements. One of the challenges when replacing these laminates with mono-material PE structures is the meeting of stiffness and optics requirements. Machine-direction orientation (MDO) processing can be used to help improve optical properties and stiffness of PE substrates by stretching the film in the machine direction.

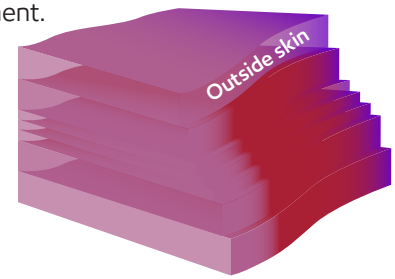
Failure of the film during the MDO stretching process is a risk that converters are interested in addressing. The risk of MDO film failure during the stretching process can be reduced by a lower stretch ratio, but needs to be balanced with the requirement for high stiffness and high optics.

Reifenhäuser and ExxonMobil collaborated to develop an MDO film solution with an outstanding balance between high stiffness, high optics and a moderate MDO stretch ratio.

Solution

A seven-layer MDO structure as illustrated below with a stretch ratio of 5.8 was developed by Reifenhäuser and ExxonMobil.

The moderate stretch ratio can help to reduce the risk of MDO film failure during production and offers possibilities for additional property enhancement. The simplicity of the structure can reduce material handling in the production phase and can be used as a platform to help develop solutions to match specific requirements.



Exceed™ Flow m 0520 performance polyethylene offers:
- Enhanced bubble stability
- Improved stiffness

ExxonMobil™ HD 6107 polyethylene offers:
- Outstanding stiffness
- Excellent gel performance
- Improved gauge profile

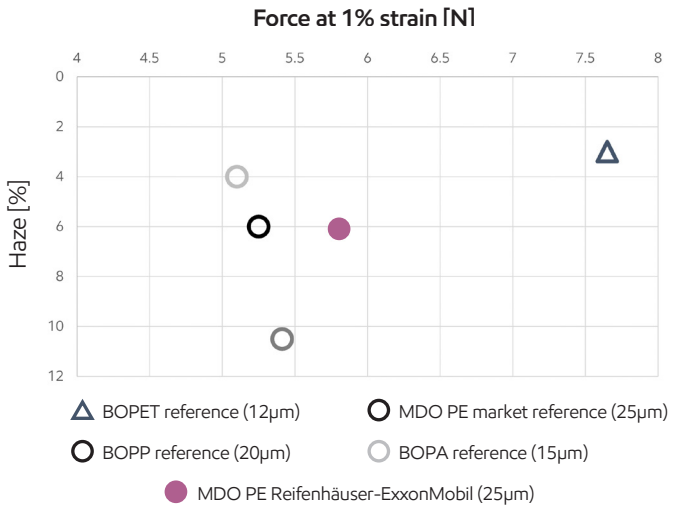
Exceed™ Stiff+ m 0820 performance polyethylene offers:
- Improved processing
- Stable process throughout longer production
- Extreme toughness

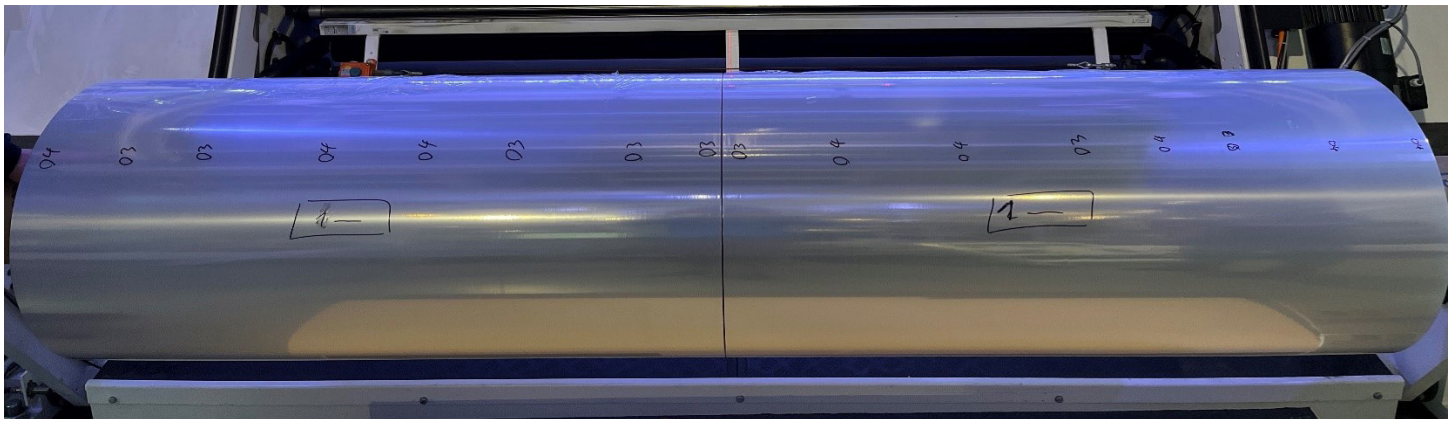
Reifenhäuser

Results

The mechanical and optical properties of the developed MDO structure reached the performance levels of the BOPP and BOPA references.

In addition to excellent film properties, the combination of ExxonMobil's latest generation of performance materials and Reifenhäuser's high-end MDO processing also enabled film rolls of very high winding quality, which can help facilitate downstream processes like printing. The variation of the circumference was measured to be below 1mm across a roll width of 2m, as demonstrated in the photo below.





Test item	Test method
Tensile properties film at room temperature in MD	ExxonMobil test method
Total haze	Based on ASTM D1003-21 B
Gloss	ExxonMobil test method
Circumference	Reifenhäuser test method

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 and their business goals.

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