



Vistamaxx™ performance polymers

Vistamaxx™ performance polymers can help enable post-industrial recycling* (PIR) of bicomponent (bico) nonwoven trims in spunbond nonwoven applications

Spunbond nonwoven converters today have a lot of PIR diaper trim material that is either discarded or sold to a third-party compounder for recycling.

Nonwoven converters can face challenges in the recycling of bico PP/PE trim waste back into their spinning line. One current common practice for handling bico trim is to sell it to a third-party compounder. The pelletized trim is then often used in injection molding applications.

Below is a potential method to recycle PIR bico trims back into spunbond nonwoven applications using a compounding process.

Vistamaxx™ can help to enhance masterbatch quality and performance

From the atomic force microscopy (AFM) images in table 1 of the next page, Vistamaxx™ 7020BF demonstrated to contribute for improved phase dispersion in COMPOUND 2 & COMPOUND 3, which contain 10% and 30% of Vistamaxx performance polymers respectively, compared to COMPOUND 1, which contains no Vistamaxx. Improved phase dispersion can contribute for better spinnability and overall mechanical performance of the nonwoven fabric.

The AFM images also show that Vistamaxx™ performance polymers can function as a good compatibilizer of polypropylene (PP) & polyethylene (PE). Representative bico trim consisted of roughly 70% PP and 30% PE.

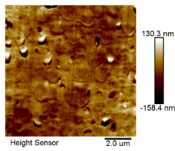
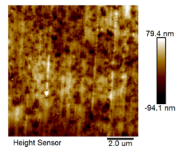
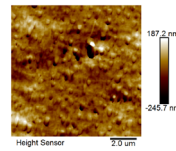
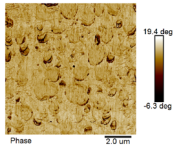
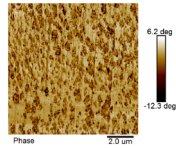
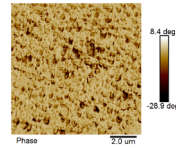
Compound's Formulation	COMPOUND 1	COMPOUND 2	COMPOUND 3
Bico Trims-PP/PE (70/30)	100%	89.8%	69.8%
Vistamaxx 7020BF	0%	10%	30%
Secondary antioxidant	0	0.2%	0.2%
Compound's Attributes	COMPOUND 1	COMPOUND 2	COMPOUND 3
Melt Flow Rate (2.16Kg, 230°C)	47.7g/10min	43.1g/10min	34.2g/10min
Dispersion of phases by atomic force microscopy (AFM)			
			
Molecular Weight Distribution (Mw / Mn)	3.48	3.43	3.23

Table 1: Source from ExxonMobil internal testing using ExxonMobil test methods.
Data traceability: R2112-005736

*Recyclable in communities with programs and facilities in place that collect and recycle PE/PP PIR diaper trim material

The addition of Vistamaxx™ 7020BF can reduce the molecular weight distribution (MWD) by up to 7% as shown in Table 1, which would support better processability during the nonwoven fiber spinning process as compared to polymer melts with wider MWD.

Vistamaxx™ performance polymers can assist with the spinnability of recycled bico material into nonwoven fabrics, which can result in improved mechanical performance and help enable improved fabric appearance.

The value of Vistamaxx performance polymers is further demonstrated in nonwoven spinning performance as well as fabric quality with a focus on COMPOUND 1 and COMPOUND 3. Dosage of Vistamaxx 7020BF as neat blending is varied per the formulation in table 2 below.

Fabric Sample	Formulation
1	87% Exceed™ PP3155E5 + 12% COMPOUND 1 + 1% slip
2	87% Exceed PP3155E5 + 12% COMPOUND 3 + 1% slip
3	82% Exceed PP3155E5 + 12% COMPOUND 3 + 5% Vistamaxx 7020BF + 1% slip
4	77% Exceed PP3155E5 + 12% COMPOUND 3 + 10% Vistamaxx 7020BF + 1% slip

Table 2: Fabric formulation

During the spinning of nonwoven fabric with the compounded masterbatch, the following observations on spinnability and the presence of defects on the fabric were recorded in Table 3. With 5% Vistamaxx 7020BF added during spinning, spinnability was improved with less dripping when compared to the production of fabric Samples 1 and 2 where no additional Vistamaxx was added during the spinning process. However, no further improvement in spinnability and fabric surface was observed when Vistamaxx 7020BF dosage was increased from 5% to 10% as a pure blending partner.

Fabric Sample	Spinnability	Defects
1 (Reference)	Poor	Significant
2	Below average	More than usual
3	Normal	Few
4	Normal	Few

Table 3: Observation on spinnability and defect during spinning trial.

The highest active bico recycled content incorporation in the overall formulation validated during the trial was 8.4%. When the recycled content incorporation rate exceeded this percentage, significant dripping occurred during spinning.

In terms of the fabrics’ mechanical performance shown in Table 4, it was observed that the tensile performance of the fabrics containing COMPOUND 3 outperformed COMPOUND 1. This further supports the value of Vistamaxx performance polymers in enabling better phase dispersion, which can lead to a stable fiber spinning process ultimately the mechanical performance of the nonwoven fabric, as detailed below.

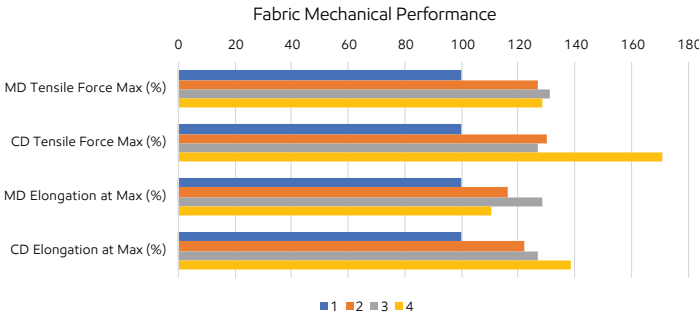


Table 4: Mechanical performance of fabric samples
MD: Machine Direction - CD: Cross Direction

In terms of processing guidance, it was observed during the trial that lowering the die/melt temperature and cabin pressure can enable stable spinning, which can lead to fewer defects in the nonwoven fabric.

In ExxonMobil testing, Vistamaxx performance polymers demonstrated the possibility of supporting plastics circularity. Starting with the compounding step, Vistamaxx performance polymers can help enable masterbatch quality, while at the spunbond spinning step, they can help with the mechanical performance of the resulting nonwoven fabric that incorporates PIR.

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. The composition of the products are unchanged, it is only the names that updated. We will be making these modifications over the next few months, through mid 2025, so you will see both old and new grade names highlighted during that time. Grade slate of Vistamaxx™ performance polymers will keep unchanged. Here's a quick overview of brands and grade names that have changed in this document:

Legacy commercial name

ExxonMobil™ PP3155E5

New commercial name

Exceed™ PP3155E5

Want to see what's changed in our portfolio? Go to exxonmobilchemical.com/sptransform

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 sustainability and business goals.



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