ExxonMobil
Signature Polymers

Case Study

Exceed™ Stiff+ Exceed™ Flow+

# Exceed™ Stiff+ and Exceed™ Flow+ performance polymers can enable downgauged air column bags for e-commerce logistics

Downgauging | Burst resistance | Stiffness | Toughness

## Challenge

**Reduce material use by downgauging PE films used for air column bags**

Zhejiang Jujie New Material Co., Ltd., a leading integrated film convertor and bag maker based in China, wanted to reduce material use by downgauging the co-extruded polyethylene (PE) films used for its air column bags. Air column bags are widely used as protective packaging during e-commerce logistics and transportation.

"Jujie is always looking for a competitive edge, so we wanted to improve film performance by offering air column products with the sustainability benefits of less plastic consumption, while delivering premium protective performance," Zhi Ping Qi, Chairman of Jujie Corp.

The ultimate goal of Jujie was to create an air bag solution that would build brand awareness, grow market share and create overseas business opportunities.

## Solution

**Exceed Flow+ and Exceed Stiff+ m 0926 metallocene PE can enable downgauged PE films that can use less material**

Jujie collaborated with ExxonMobil's polyethylene business — which is acknowledged as driving packaging advances through value chain collaboration — to use performance materials, which can offer the sustainability benefit of enabling the use of less plastic through downgauging while still maintaining performance.

The typical structure of an air column bag is PE/tie layer/PA/tie layer/PE co-extrusion. ExxonMobil provided Jujie with one of its new downgauged starting formulations that uses Exceed Stiff+ m 0926 and Exceed Flow+ m 0516 metallocene PE in the PE layer of the air column bags. Starting from the ExxonMobil-provided formulation, Jujie made custom modifications to arrive at a solution that works in its 5/7/9 layer blown lines, and Jujie then seals and tubes the film into bags with its bag making line.

# Results

### Downgauged air column bags offering premium protection during transportation

Data from trials conducted by Jujie demonstrated that a 45-micron film, downgauged by 10% compared to a market reference film, offered excellent burst resistance, comparable film stiffness and needle puncture performance, as well as strong cost and material savings potential.

"When downgauging a film, it is often difficult to reduce the thickness of both the polyamide (PA) and PE layers without compromise of mechanical performance," said Zhi Ping Qi. "This is especially true for the PA layer, which is generally used to provide stiffness. But using Exceed™ Stiff+ and Exceed™ Flow+ in the PE layer makes it feasible to downgauge by 10% and deliver strong cost optimization potential with comparable performance."

The success of the trial led to the commercialization of 45-micron air column bag by Jujie, which helps to establish its technology advantage compared to other market players with the 50-60 micron products.

Using Exceed Flow+ m 0516 and Exceed Stiff+ m 0926 has allowed Jujie to create an air column product solution which can provide the sustainability benefit of using less material, while delivering premium protective performance compared to traditional cushion packaging made using expanded polystyrene (EPS) and expanded PE (EPE). The solution can also offer significant potential cost advantages versus alternatives, and excellent appearance.

"Working with ExxonMobil has allowed Jujie to develop a solution, which has increased the company's market share in recent years," said Zhi Ping Qi. "Jujie has become one of the leading air column suppliers with about 30% market share."

### Combined PE and PA downgauging test

In this test result, the solution comprising Exceed Stiff+ performance polymers delivered excellent burst resistance and comparable film stiffness and needle puncture performance vs. the market reference at 10% downgauging.

Downgauging of both the PA and PE layers offers the opportunity for material cost savings with comparable mechanical performance. See below for comparison of an ExxonMobil starting formulation with market reference.

| | **Reference: 50µm** | **Downgauge solution: 45µm** |
|---|---|---|
| PA gauge* | 7.5µm | 6.75µm |
| PE layer formula | ~50% performance PE-based market reference | Exceed Stiff+ m 0926<br>Exceed Flow+ m 0516 |

* Calculated based on extrusion amount during film production, with assumption that all layers kept at same density.
Data from tests performed by or on behalf of ExxonMobil.

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ExxonMobil Signature Polymers

**Bring your impossible**

# 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 |
|---|---|
| Exceed™ S 9243 | Exceed™ Stiff+ m 0926 |
| Exceed™ XP 6056 | Exceed™ Flow+ m 0516 |

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**