



Exceed™ Tough+

Innovative form-fill-seal polyethylene heavy duty sack with self-venting feature for fine powder industry



High moisture barrier for extended product shelf life



Excellent bag drop with improved toughness and strength



Designed for recyclability* with weight reduction opportunity



Incorporation of recycled PE content

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

The industry needs an improved heavy-duty-sack (HDS) packaging solution for moisture sensitive and fine powder products.

Fine powder product packaging is a specialized field focused on the containment, protection, and presentation of powdered substances such as food ingredients, pharmaceuticals, chemicals, construction material and cosmetics. As powders are lightweight and easily dispersed, they present unique challenges during packaging. These include controlling dust to prevent product loss, protecting the product from moisture which can cause clumping or spoilage, and ensuring consistent flow during the filling process.

Typically, fine powder products are packed in paper sacks due to their cost-effectiveness. However, this packaging material comes with several challenges. Paper is porous and can absorb moisture from the surroundings, potentially leading to the clumping of the powder.

Polyethylene liners were introduced in multi-layer paper sacks to address this problem, but multi-material packaging can be difficult to recycle. Paper sacks are also prone to tearing or bursting under rough handling or stacking pressure and fine powder particles can escape through seams or micro tears.

Scientex Berhad (Scientex), a leading flexible plastic packaging manufacturer based in Malaysia, recognized the challenges faced by the industry and wanted to support brand owners in transitioning from traditional paper-based packaging to plastic-based alternatives.

*Designed with features intended to support recyclability. Actual recyclability depends on factors such as local collection, sortation, and recycling infrastructure, as well as the condition and configuration of the film after use. However, access to facilities that accept and process plastic film is limited and not widely available.

Solution

ExxonMobil Signature Polymers Exceed™ Tough+ performance polyethylene improved toughness and strength of PE-based heavy-duty sacks, while offering cost reduction and design for recyclability opportunities

Scientex partnered with ExxonMobil Signature Polymers, Windmüller & Hölscher (W&H), and Haver & Boecker oHG (H&B) to develop a polyethylene (PE)-based form-fill-seal (FFS) HDS solution for moisture sensitive and fine powder products. This innovative packaging offered excellent mechanical performance while being designed for recyclability*. W&H, headquartered in Germany, is a leading manufacturer of machinery and systems for flexible packaging production. H&B, also based in Germany, is widely recognized for its expertise in filling, bagging, and packaging technologies.

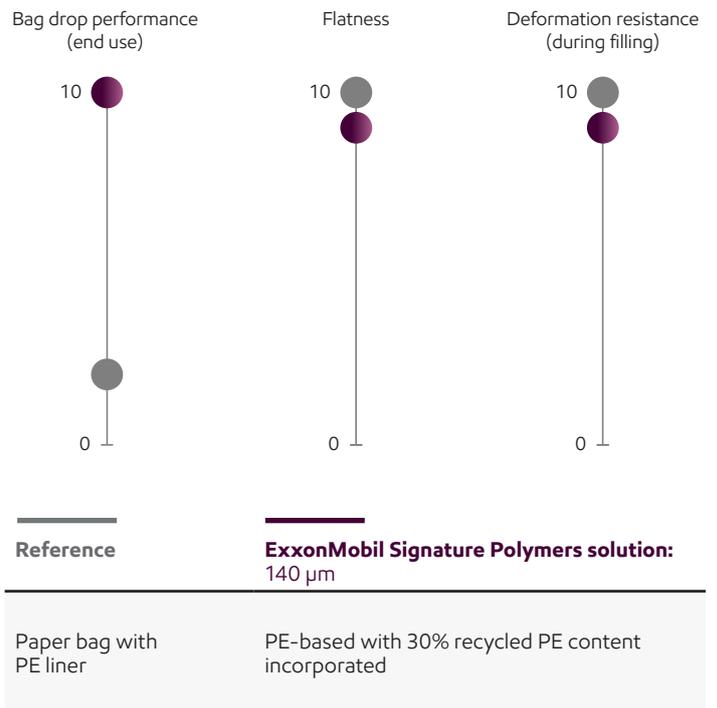


To meet the demanding performance requirements for handling fine powder product, ExxonMobil Signature Polymers Exceed™ Tough+ performance resins were selected for their exceptional stiffness, toughness and moisture barrier properties.

While downgauging could offer measurable cost-saving advantages, the transition to a fully PE-based HDS solution could deliver significant operational benefits. Notably, the improved drop performance of a fully PE-based HDS showed enhanced product protection during handling and transport, reducing damage and product loss. Their resistance to deformation and ability to maintain flatness ensure compatibility with existing filling and stacking processes, minimizing operational disruptions and retraining efforts. Furthermore, the superior mechanical properties of the PE structure enabled the incorporation of 30% recycled PE (rPE) content.

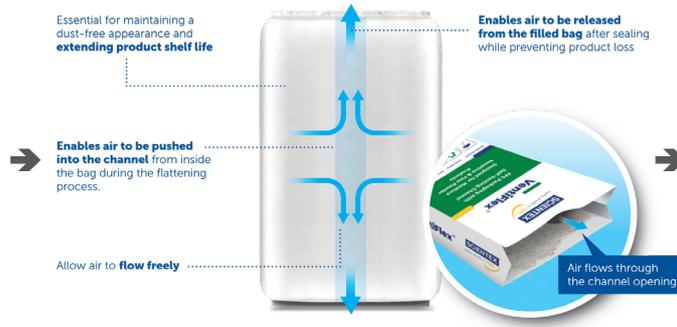
Scientex's VentiFlex® FFS HDS featured a venting system that enabled excess air to escape the bag after the filling process without exposing the product packaged inside. This feature is essential for helping maintain a dust-free appearance and extend product shelf life. Leveraging the properties of Exceed™ Tough+ performance polymers and W&H's machinery expertise, Scientex was able to produce an innovative, self-venting, weatherproof, tubular FFS film that is approved for use on FFS machinery with enhanced sealability and durability for building materials and powdery products.

Form-fill-seal heavy-duty sack solution (up to 25 kg) end use performance comparison in relative scale (paper vs PE):



Based on trial observation and market feedback. For relative comparison purpose only and drawn not to scale.

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The FFS HDS solution delivered these downstream values:

- Reduction in packaging weight, with the PE-based bags weighing up to 13% less than a reference paper-based sack.
- High moisture barrier, which can help prevent product loss due to moisture ingress or powder sticking to the sacks.
- Outstanding bag drop performance with excellent bag toughness and strength.
- Enhanced brand appeal with high quality print possibilities.
- Incorporation of recycled PE content.
- Mono-PE structure designed for recyclability*.

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Results

Improved operational performance and potential cost savings from using FFS HDS solution using Exceed™ Tough+ resins

A cost and performance analysis was conducted to evaluate the impact of switching from traditional kraft paper bags with PE liners to the fully PE-based FFS HDS solution. The key to unlocking cost savings lies in selecting the optimal PE formulation with the right bag format. While the market offers a range of general-purpose options, not all are suited for high-volume applications where suboptimal choices can lead to increased costs.

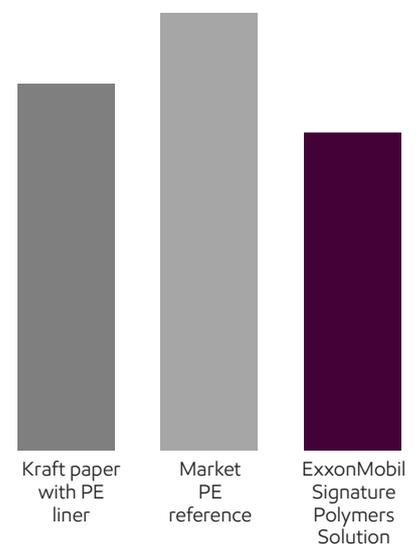
Based on a scale of 10 million bags annually, the adoption of an Exceed™ Tough+ based HDS demonstrated clear advantages:

- 6% reduction in packaging costs
- Designed for recyclability* with a mono-material PE design.

Cost saving potential for HDS from material upgrade:

	Kraft paper with PE liner	Market PE reference	ExxonMobil Signature Polymers Exceed Tough+ Solution
Number of sacks used (piece/year)	10 million	10 million	10 million
Thickness	30 µm (liner)	200 µm	140 µm
Packaging weight /unit	156 g	186 g	135 g
Packaging material cost (USD/piece)	0.32	0.36	0.30
Total packaging material consumption (kT/year)	1.56 kT	1.86 kT	1.35 kT
Estimated total cost/year	\$3.2 mil	\$3.6 mil	\$3 mil

Estimated total cost (USD/year)



“In packaging innovation, there are usually compromises to be made — either on cost or on performance. However, we continue to be amazed at how the VentiFlex solution enabled by ExxonMobil Signature Polymers resins compares with traditional options, delivering shelf life, safety, toughness, brand appeal, and recyclability, all while maintaining cost parity. This affirms our belief that VentiFlex is undoubtedly the future of packaging for moisture-sensitive and fine powder products,” said Mr. Scott Lim, Executive Director of Packaging for Scientex Berhad.

“We are thrilled to partner with Scientex in developing an innovative powder packaging solution, which uses ExxonMobil’s advanced polymer technologies to deliver superior performance and efficiency. Also, by partnering with other industry leaders like W&H and H&B, we are creating a comprehensive end-to-end ecosystem that empowers the end users to innovate in powder packaging, and meet the evolving demands of global markets. This alliance exemplifies our commitment to driving value through integrated solutions and long-term partnerships,” remarked Molina Albright, Global Strategic Alliance Manager for ExxonMobil Product Solutions.

Dr. Bjoern Lindemann, Managing Director of Haver & Boecker Southeast Asia, shared, “With ADAMS® technology, Haver & Boecker has revolutionized the packing market worldwide. We are proud to contribute to this market transition by enabling profitable packaging in weatherproof and tear-resistant PE bags. With decades of expertise in high-performance filling systems, we play a key role in supporting the shift toward optimized packaging that meets market demands with a more careful use of all resources, raw materials and products.”

This innovative solution highlighted the value chain’s collective expertise in developing a high-performance packaging solution that addresses the industries’ demands for moisture sensitive and fine powder products in various industries.



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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 business goals.



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