



Superior performance for heavy duty shipping sacks

A differentiated polyethylene-based solution for Heavy Duty Shipping Sacks (HDSS) applications that offers cost effectiveness and sustainable benefits is now available.

With the rapid projected growth in polymer plants springing up throughout Asia and the Middle East, HDSS is one of the largest and fastest growing segments for film converters.

Typically, HDSS are used to pack more than 20kg goods ranging from resins, pigments, fertilisers, sand, and food to chemicals. These packages can weigh up to 50kg. 20 years ago, HDSS were 220µm thick, today HDSS used for this same purpose are just 120µm thick – downgauged by nearly 50% and yet have better performance properties than the thicker films.

An increase global trading has also dictated increase in transportation of goods, thus the need to protect materials packed in HDSS becomes evident. As the market starts to get more competitive, understanding film performance and cost is important to developing successful strategies for growth in sales and profitability. It is not too far-fetched to state that HDSS will continue to downgauge to 80µm.

A common issue is seen during the filling stages resulting in film wastage. Typically, each HDSS roll weighs about 800kg, resulting in extreme pressure on the innermost film layers. This can result in more than 35% film wastage since the film wound at the core of the roll has difficulty in opening. This problem is seen when competitive products are used in the sealant layers of HDSS. On the contrary, PE, based on Borstar technology, with its inherent matt look will negate this effect when used in the sealant layers.

Further-on, in many parts of Asia and Middle East, HDSS are handled very roughly since labour cost is low. Just imagine in the case of polymer resin, the transfer of loose resin bags from the point of packing into the truck and having them unloaded into the container. On arrival, the bags have to be transferred from the ship to another truck and then transported to the warehouse, before being finally transported to the factory where they are unloaded. A total of 6 times of handling the bags with the possibility of damage experienced. Without a doubt, the need for outstanding mechanicals in HDSS is eminent.

Recent improvements in film technology deliver improved performance and value benefits from the onset of film formulation decision to filling of the polymer bags and across supply chain.

Compared with conventional alternatives, it has been shown that HDSS PE films, based on Borstar technology, offer:

- Improved bubble stability with potential increase in output due to its bimodal molecular weight distribution (see below)
- Superior toughness, puncture resistance and environmental stress crack resistance (ESCR) minimising bag failures during filling, transport and storage
- Balanced tensile, modulus properties and creep for enhanced pallet stability during transportation and storage
- Stiffness even at thinner films for good machinability and easy handling
- Increased cost effectiveness and minimal wastage due to its unique product offering giving balance of toughness and stiffness
- Structure formulation simplification yet with similar or improved film performance and quality consistency, increasing convenience for converters.

PE such as those produced using the

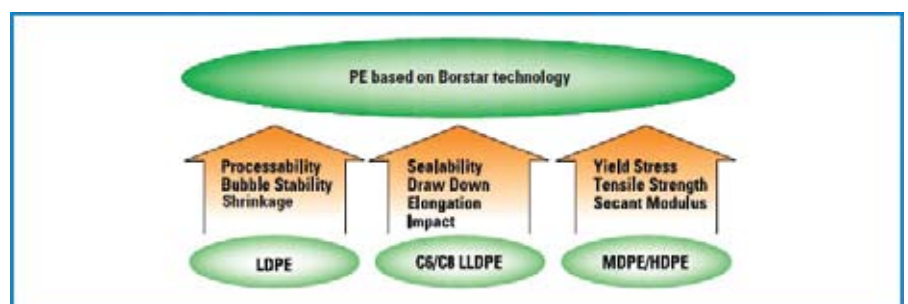


Figure 1: Optimal balance of properties

Borstar technology provides benefits on both multilayer and monolayer extrusion lines. Film converters can incorporate it in the middle/core layer for increased stiffness which facilitates downgauging. PE can be used in sealant layers pure or in blends for improved seal strength and reduction in wastage during filling as described earlier. When used in blends with other polymers can save converters up to 35% when film is downgauged by over 30% and users up to 30% from wastage reduction of its total cost.

It is important to consider the cost/performance balance given the myriad of products available in the market today. Failure to assess performance against requirements can lead to either over-design (resulting in unnecessary cost) or underperformance of the final package.

The use of differentiated PE can aid customers to improve their bottom line by capitalizing on the outstanding toughness in terms of dart impact, tensile strength, puncture resistance, stiffness and at thinner gauges.

Technological strength

Borstar is Borealis' proprietary technology that supports differentiated polyethylene and polypropylene products. The Borstar polymerisation process enables the combination of the product properties of various conventional PEs into one unique product

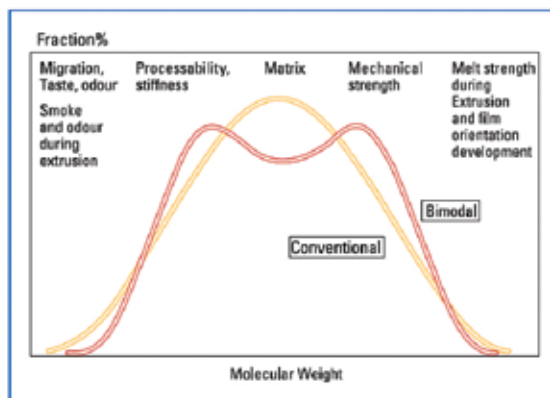


Figure 2: Molecular Weight Distribution curve

family. The fundamental feature of this technology is its dual reactor operation, which allows production of materials for high performance film packaging with a broad bimodal molecular weight distribution and tailored comonomer distribution. A bimodal PE is a mixture of two very different molecular weights (as can be seen from the MWD curve, see Figure 2). Two important features result from this: good processability and good mechanical strength. In most applications, good mechanical properties come from high molecular weights. A major challenge for polyolefin producers is to combine high mechanical strength and good processability, since high molecular weight alone generally leads to poor extrudability. This process can overcome the extrudability diffi-

culty by tailoring the molecular structure to produce bimodal products.

Unlike conventional bimodal processes, which are limited to HDPE and MDPE products, this technology can also produce bimodal LLDPE resins, due to a unique loop and gas phase reactor configuration.

More value added qualities

This technology yields a number of special property and structural benefits. These include high environmental stress-cracking resistance (ESCR), low shrinkage and long-term creep/burst resistance. The process offers simultaneous improvements in conversion economics and in key environmental aspects, such as source reduction and recyclability.

About Borouge Film and Moulding

Borouge's moulding business specialises in supplying advanced polyolefin plastics for injection and blow moulding processing technologies. Utilising leading technologies such as Borstar® and BNT (Borealis Nucleation Technology) offers a product portfolio for a wide range of applications. With over 50 years of experience and pioneering solutions, Borouge together with Borealis have established a leading position on the film and moulding market across Europe, the Middle East and Asia.

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