



► **High Melt Strength
Polypropylene**

Braskem

Ampplex[®]

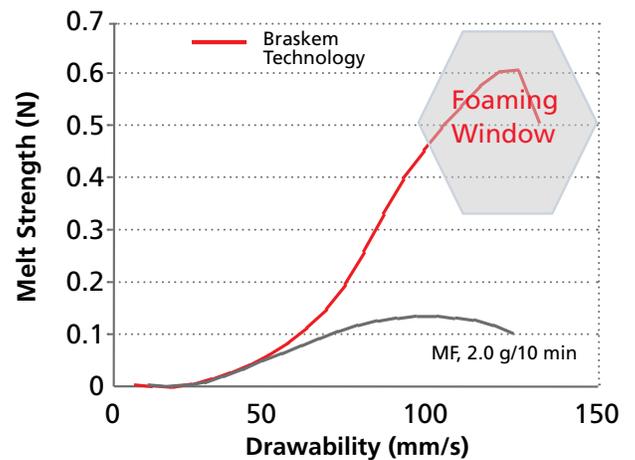
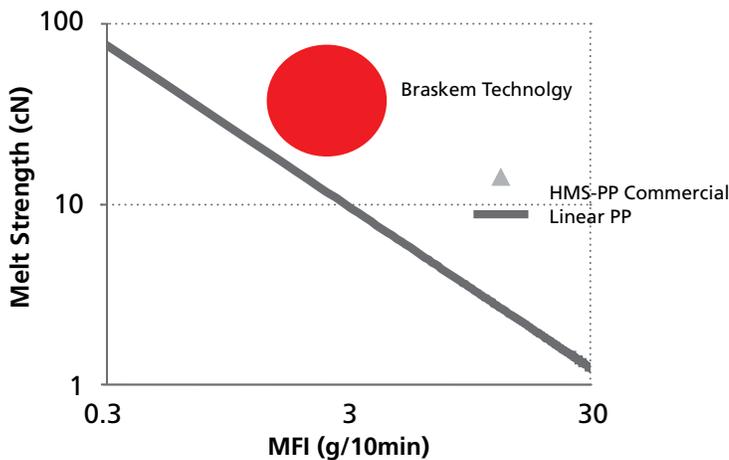


Polypropylene benefits combined with high melt strength open doors for many applications

► High Melt Strength Polypropylene Features and Benefits

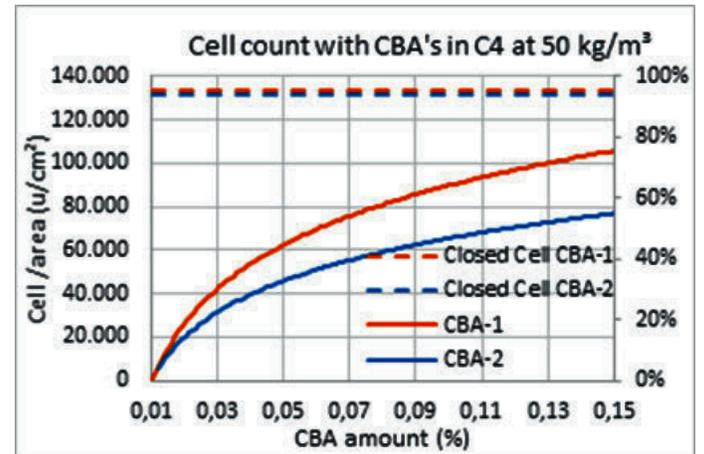
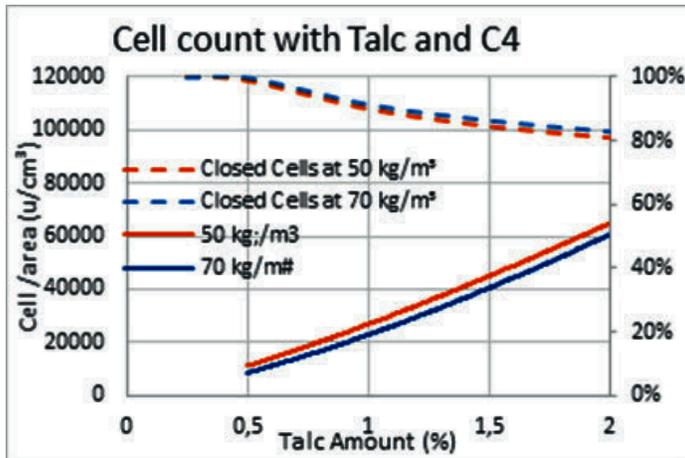


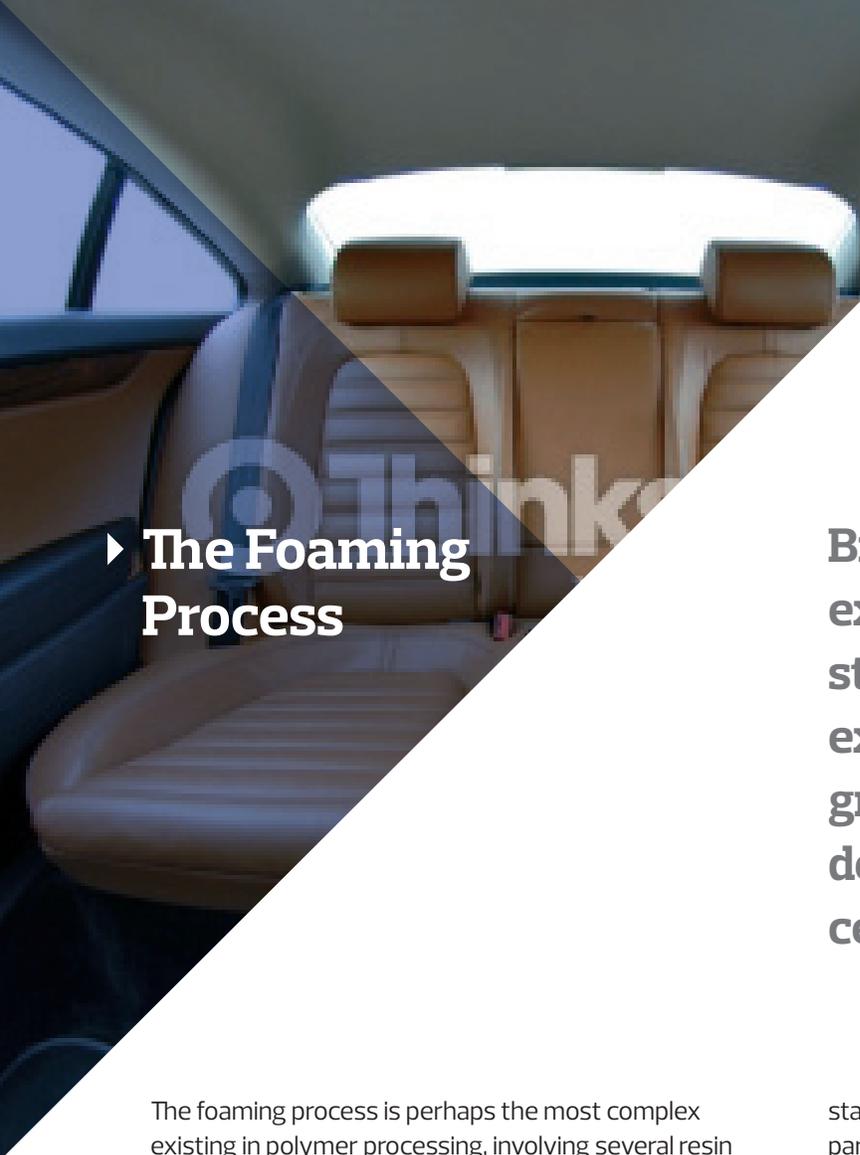
- High melt strength and extensibility of Ampplex HMS PP coupled with the mechanical properties and chemical resistance of standard PP allow entry into non traditional PP applications
- With Ampplex HMS PP, foam can be produced using CO₂ or butane in inline or tandem processes achieving densities as low as 30 kg/m³
- Synergistic performance when blended with a range of polymers
- Benefits in solid applications include increased sag resistance with outstanding top load and wider processing windows



► Applications

- Ampplex HMS PP is designed to be used in low and high density (30 -150 kg/m³) foam applications such as extruded sheet, planks, tubes and profiles
- End use applications include protective packaging and automotive headliners
- Ampplex's high melt strength and sag resistance also provides value in thermoforming, blow molding, injection molding and blown film





► The Foaming Process

Braskem Ampplex 1020GA exhibit both high melt strength and high melt extension, enabling these grades to achieve very low density foams with controlled cell size and morphology

The foaming process is perhaps the most complex existing in polymer processing, involving several resin characteristics, equipment details and also the formulation. In general terms the liquefied gas or supercritical fluid state is injected at high pressures into the molten polymer. This mixture is homogenized and is cooled to temperatures significantly lower than for injection molding PP products. At this lower temperature, the pressure is reduced in the die exit and the dissolved gas is no longer

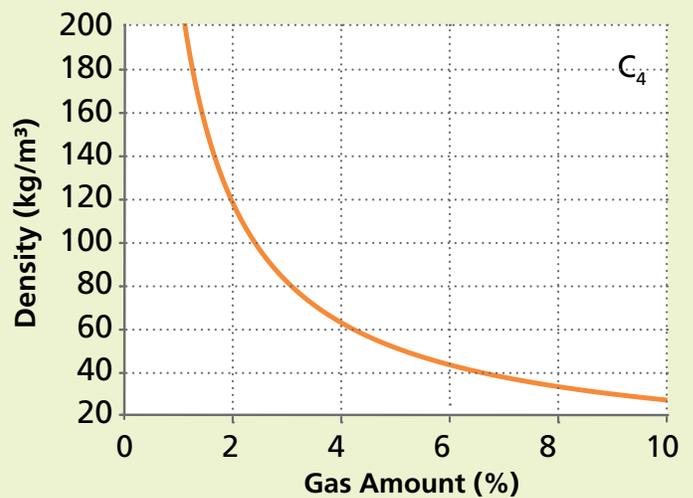
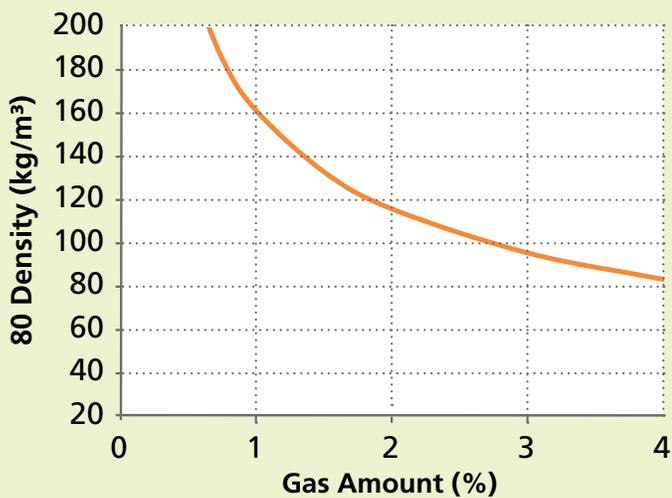
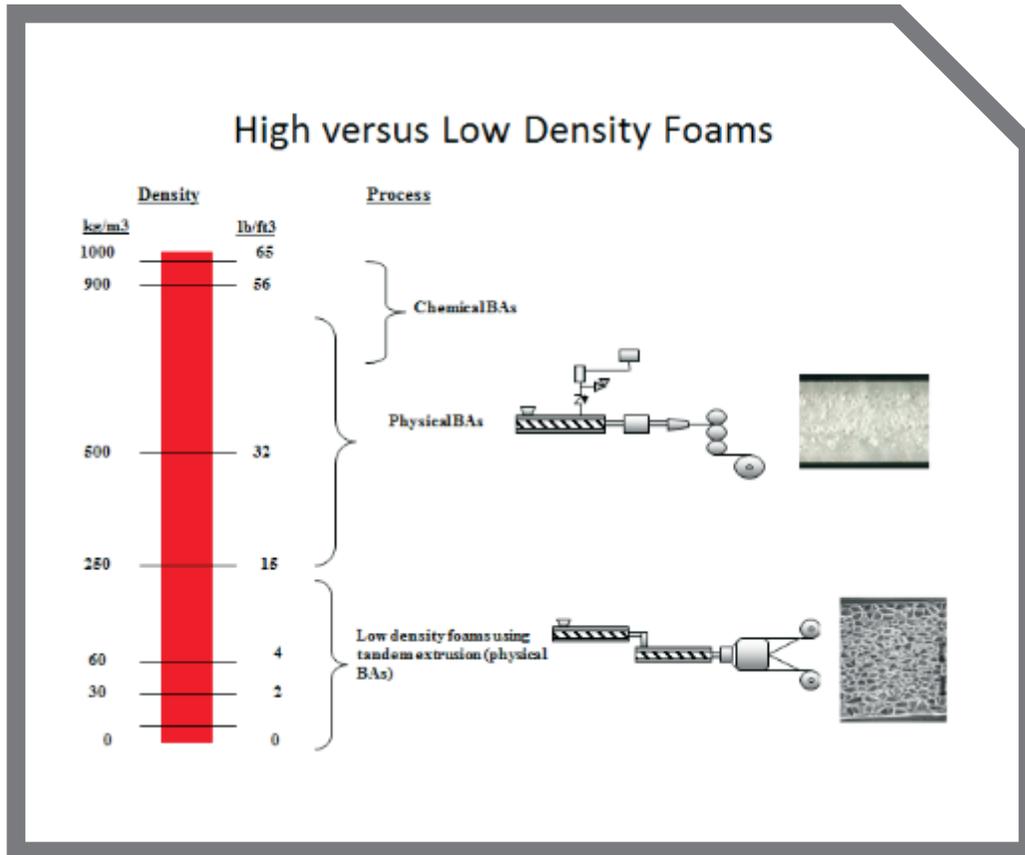
stable inside the polymer, forming cells that expand the parts. Chemical foaming agents are also used to nucleate the foam providing a more uniform cell structure.

HMS offers some important superior characteristics such as high dissolution capacity of the expansion gas with high solubility, resulting in greater uniformity and ability to reach low densities with less gas consumption, high melt strength, high deformation.

Property	Unit	Ampplex x 1025MA	Ampplex x 1020GA	Linear Homopolymer
Melt Flow Rate	dg/min	2.5	2.0	2.0
Melt Strength	cN	50	60	10
Flexural	kPSI	330	264	
Modulus	(Mpa)	(2276)	(1820)	255 (1758)
HDT@66psi	C	130	117	115

► Braskem HMS – Process Flexibility

Braskem's Ampplex HMS PP products are designed to be used in low and high density foam applications and with multiple physical and chemical blowing agents. The technology has been demonstrated on tandem and inline extrusion processes. This provides customers with a wide processing window and broad application possibilities.

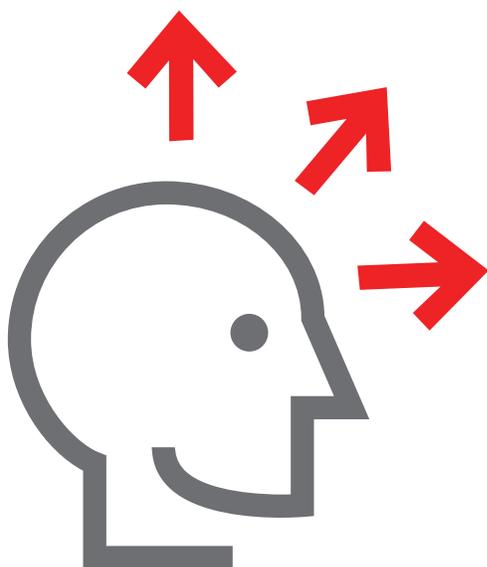




▶ Why you should partner with Braskem

Braskem's Customer-driven Innovation

Applications often come along that require new levels of performance. Braskem has the capability to provide the technical expertise and **innovation** that meets your product differentiation requirements. We understand the importance of a competitive and dependable supply of high-quality products for the **future**.





▶ Accelerating Innovation and Speed to Market

Two technologically integrated centers located in Pittsburgh, PA, and **Brazil** employ more than 300 specialized professionals who **Collaborate** with customers on joint product and applications development. These state-of-the-art facilities feature:

- On-site specialized analytical labs provide
- Pilot-scale equipment that replicates customer production environments for true-to-life polymer testing
- Compounding, film, sheet, thermoforming and foaming applications equipment that create innovative solutions to meet customer needs



Braskem is one of the world's leading plastics and chemical companies with 40 industrial plants in Brazil, the United States, Germany and Mexico – the company's newest industrial complex is a joint venture with Idesa, which represents a \$5.2 billion investment.

Braskem is the largest producer of thermoplastic resins in the Americas and the leading producer of biopolymers in the world, creating more environmental-friendly, intelligent and sustainable solutions through chemicals and plastics. Known for innovative solutions such as I'm green Polyethylene™ made from renewable sugarcane and UTEC®, the company's own trademarked Ultra High Molecular Weight Polyethylene for high performance applications, Braskem's products and technologies enable the automotive, packaging, healthcare, and construction industries to produce goods that enhance quality of life for people around the world.

Braskem America is a wholly owned subsidiary of Braskem S.A. headquartered in Philadelphia. The company is the leading producer of polypropylene in the United States, with five production plants located in Texas, Pennsylvania and West Virginia, and an Innovation and Technology Center in Pittsburgh.