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Melt index (MI) and density are most often used to characterize LDPE for extrusion coating applications. While the MI helps us understand how the polymer may behave in the extruder and the density helps determine the final properties of the film or coating (stiffness, sealability, etc.), neither is a good measure of how the polymer will behave once it exits the die. In particular, these parameters are not a good indication of how much the polymer will neck-in (lateral reduction of the web width) or how much the polymer can be drawn down during coating. This is because these phenomenons are more a function of the polymer's elasticity than viscosity. Polymers are known as viscoelastic materials since they exhibit both solid- like (elastic) and liquid-like (viscous) behavior. The resins most often used in extrusion coating, LDPE, EMA, EVA, acid copolymers and ionomers, have moderate molecular weight, broad molecular weight distribution and considerable amounts of long chain branching. Their molecular architecture gives rise to a good balance of elastic and viscous behavior and an optimum balance of properties. In the case of polar copolymers such as EMA, EVA, acid copolymers and ionomers, chemical interactions also contribute to the elasticity.

Polymer melt elasticity is difficult to characterize. Several methods are used with various levels of success. Some try to characterize the underlying molecular structure, such as MW and MWD. Others measure rheological properties that are sensitive to changes in the high MW molecules and long chain branching that most contribute to elasticity. Size exclusion chromatography measures MWD, but the results can be confounded by the presence of long chain branching. Melt swell, often measured using a melt indexer, measures the expansion of the polymer as it exits an orifice. The amount of swell is related to how much of the stress is retained from the sudden contraction of the polymer as it entered the orifice. Rheotens extensional equipment measures melt strength and drawability of a strand of polymer exiting a capillary rheometer by measuring the tension and maximum speed at break as the strand is wound-up on a roll. This test mimics some of the processing aspects of extrusion coating and is very sensitive to small changes in molecular structure. Most recently dynamic mechanical measurements (G' at low values of G") have been proposed to characterize neck-in and draw down behavior.

In summary, resins with the same MI and density may not process the same in extrusion coating; small differences in molecular structure can give rise to differences in R melt elasticity that affect neck-in and drawability. Methods to characterize the elasticity of polymers are still being developed and have not been standardized throughout the industry.

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