# Edge Fracture and its Consequences for Flow-Induced Crystallization of Engineering Thermoplastics

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Brief intervals of shear flow at rates exceeding the reciprocal of the Rouse time of the longest chains create precursors that nucleate orders of magnitude more crystals and change the morphology from ~30 μm spherulites to far smaller ~1 μm crystallites. This flow-induced crystallization (FIC) at low shear rates builds with shearing time and the quantification of FIC effects is done using specific work, the cumulative energy input to the sample in a shear flow. Edge fracture invariably occurs at the perimeter of any FIC sample sheared in either cone and plate or parallel plate geometries of a rotational rheometer. Using a controlled stress rheometer with a transparent glass bottom plate and a mirror finish reflective top plate, we quantify the radius, beyond which edge fracture occurs at a given rotation rate. Several important aspects of edge fracture will be discussed in detail. It turns out that for isotactic polypropylenes the shear rate where FIC effects start is nearly identical to the shear rate at which edge fracture is seen,