



ULTRASONIC CUTTING OF POLYLACTIC ACID (PLA) FILMS

Julius Vogel, David Grewell

Iowa State University

dgrewell@iastate.edu

Ultrasonic cutting systems are used in the industry to cut products that are difficult to cut with mechanical systems. The cutting knife/edge typically vibrates at a frequency of 20-40 kHz, heating the substrate during the cutting and simultaneously sealing the cut edges. Polylactic acid (PLA), a biodegradable thermoplastic material derived from starch, is relatively brittle compared to polyethylene terephthalate (PET), which has similar mechanical properties. This brittleness is enhanced with mechanical cutting which produces micro-cracks. This study used a Branson ultrasonic equipment to cut PLA films. The system had a knife fixed to the anvil and a horn with a flat surface that engaged the knife. The equipment operated in a ground detect mode. After cutting, the samples were tested for mechanical properties such as tensile strength, toughness and tensile elongation and compared with samples cut using a mechanical shear, as well as optically examined for micro cracks. It was found that ultrasonic cut samples had higher toughness and strain, and the edges did not have micro-cracks compared to samples cut with mechanical shears.