

The influence of fiber diameter in processing and properties of nonwoven fabric composite materials made with 50% natural fibers

S. Greer¹, W.L. Bradley²

1 Whole Tree Inc., Waco, TX,

2 Baylor University, Waco, TX.

Abstract

Non-woven fabric composites are typically made from all synthetic fibers, but recent emphasis on sustainability and environmental awareness has increased the demand for natural replacements of oil based products across many industries. Coconut fibers have been combined with polypropylene (PP) to replace polyester (PET) as the reinforcing fiber in a compression moldable non-woven fabric composite. The effects of the larger fiber diameter on the processing and mechanical results have been researched and presented along with comparisons to typical PET:PP compression molded composites. Non-woven fabric composites with larger diameter reinforcing fibers compression mold to lower densities which have lower tensile strength and stiffness, but higher flexural rigidity due to the increased thickness.

Key words: *Nonwoven fabric composite, Coconut fiber, Coir fiber, Compression molding, Fiber diameter*

1. Introduction

Nonwoven fabric composites can be used in a wide range of applications where parts are manufactured using compression molding. Nonwoven fabric composite materials are produced from a mixture of two fibers with different melt temperatures. Typically a 50:50 mixture of the two fibers is blended together and then processed into a fiber mat (or felted material as it is sometimes called). The fibers are typically 5-6cm in length, randomly oriented and nonwoven, as seen in Figure 1, where the two fibers are polypropylene (light colored) and polyester (dark colored). The resultant felted material that is seen in Figure 2 can be compression molded into parts as seen in Figure 3, with a

microstructure that reflects the flow of the lower melting point fiber effectively connecting the higher melting or

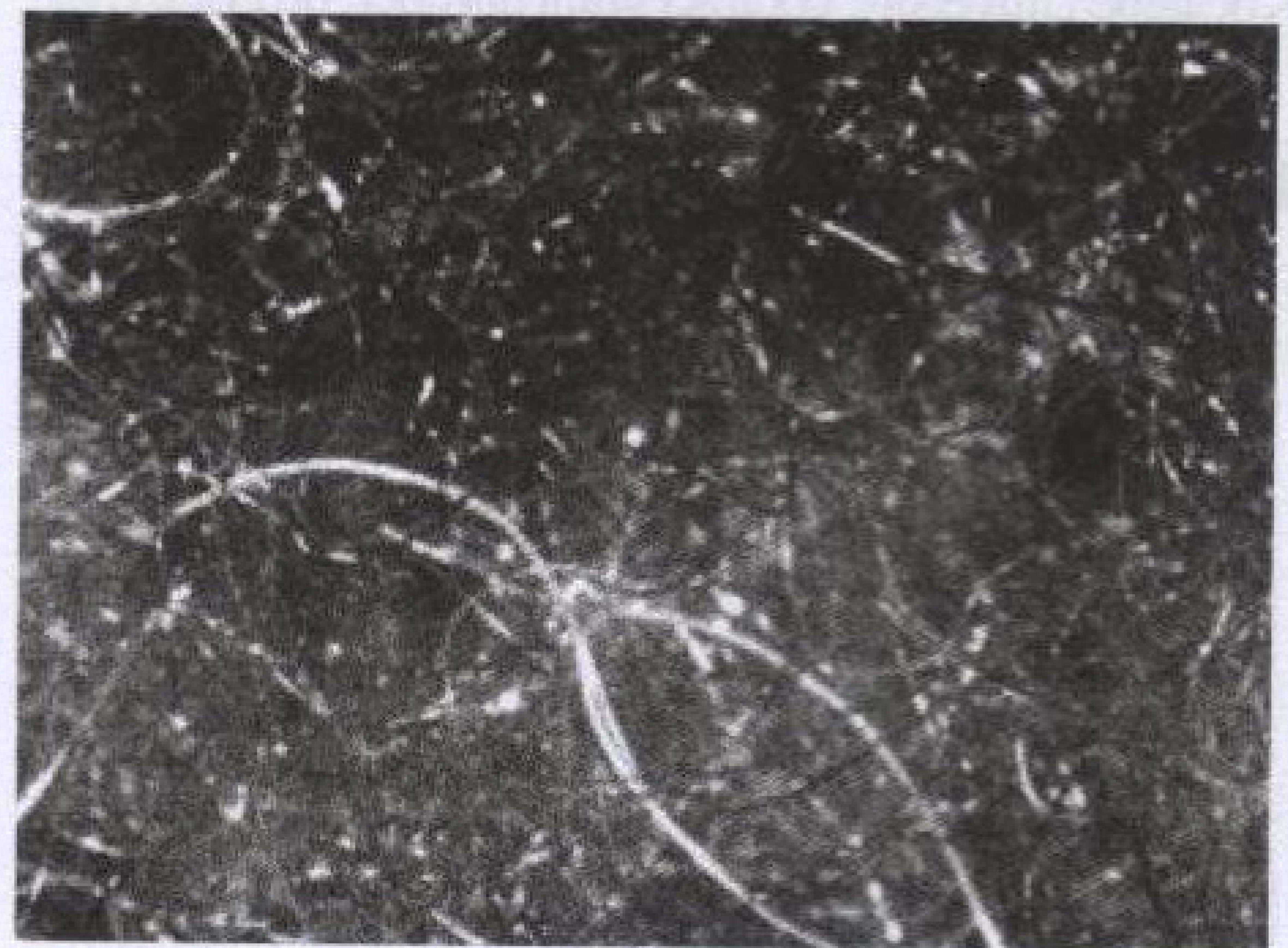


Fig. 1. Matted material made from polypropylene(light colored)and polyester(dark colored)