

Cellulose Pulp Fiber Composites

Improving Composites the “Natural” Way

Traditionally, glass fibers and mineral fillers have been used to reinforce thermoplastic composites. Why would manufacturers want to use wood fiber for reinforcing thermoplastics?

Natural fiber, or cellulosic pulped wood fiber, is less costly than traditional materials and is nonabrasive to the processing equipment, and the end product is lower in density, leading to more flexibility in forming different shapes. The problems have been getting the cellulosic fibers into an easy to use form for injection molding and getting the cellulosic fibers (a temperature sensitive material) into high temperature melting thermoplastics like nylon-6 and nylon-66.

Researchers at the Forest Products Laboratory (FPL) and A-J Engineering, both in Madison, Wisconsin, have been working with Rayonier, Inc. in Jesop, Georgia, through a Cooperative Research and Development Agreement to solve these problems. Pelletizing the fibers and using a twin screw extruder have been part of the solution. Researchers have developed a method of pelletizing the cellulose fibers into a size

and density that is convenient for handling, transportation, and the melt-blending process and at the same time preserving the fiber length. This enables the plastic processor to feed the dry cellulose fiber pulp pellets into a typical screw extruder. The cellulosic fibers can be from softwood pulps, such as Southern Pine, white pine, Caribbean pine, western hemlock, various spruces and Douglas-fir, or hardwoods such as gum oak, maple, eucalyptus, poplar, beech, and aspen.

Pelletizing the fiber solves the problems of discoloration and odors that are common with the use of cellulosic pulp fiber. Plus, the cellulosic reinforced nylon can be injection molded at reduced temperatures compared with the temperatures needed for glass fibers or mineral fillers. The automotive industry is very interested in these cellulosic pulp fiber composites because they are lighter in weight and can be formed into complex shapes.

A patent has been issued and licensing is underway for this new process.



Cellulose fiber pulp pellets.

