University Education

Green Textile Composites

Cornell's Research Being Used in Skateboard Production

TEXTILES ARE NOW BEING USED IN THE PRODUCTION OF HARDGOODS. Taking advantage of "green" textile composite research being done at Cornell, Comet Skateboards, based in Ithaca, NY, is the first manufacturer to commercially produce a hardgoods product using "green" textiles as a base component.

A composite combines two or more component materials with very different properties that work together to give the composite unique qualities that can't be obtained by a single component alone. However, rather than being dissolved or blended together, the component materials are easily distinguishable within the finished product.

Cornell uses a soy-based resin to create its composites. According to Anil Netravali, lead scientist in the department of Fiber Science & Apparel Design at Cornell, "A textile based composite is created by combining fibers, yarns, or fabrics with resin. The impregnated textile layers are then stacked and hot pressed to cure the soy-based resin. The layers are arranged, depending on the composite properties desired. The end-use dictates the construction of the composite, as well as the thickness."

In recent years, closed-loop "Cradle to Cradle" (C2C) manufacturing has become an important focus in developing true sustainable production. By using Cornell's composite technology and carefully choosing the reinforcement or matrix used in producing the composites, Netravali and his research group have discovered how to create "green" textile composites that provide properties that meet specific manufacturing requirements. The University has been at the forefront of these "green" textile composite developments, working with plant fibers like flax, ramie, jute, pineapple leaf, kenaf, banana, and bamboo that can be harvested quickly.

Professor Netravali explained, "I have been working in the area of 'green' composites' for 14 years. Initially my team worked on natural fibers and polymers, then with modified starch, and finally around 1998, we began our work on developing soy-based resins."

Unlike non-biodegradable composites that are made with petroleum-based fibers and resins that end up in landfills, Netravali's group works with natural fibers that use water as the solvent. Since all the components and chemicals used are non-toxic, Cornell's process for making its composites is also very benign.

Netravali notes, "We work with natural fibers in various forms —

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fibers, yarns, fabrics, nonwovens and their combinations, all of which are commercially available. Our composites are based on plant-based materials that can be grown every year, are annually renewable, and can easily replace petroleum-based materials. At the end of their life, they can easily be disposed of, or simply composted, creating organic soil to grow more plants."

Eco-friendly: Jason Salfi (left), of Comet Skateboards, and Anil Netravali holding a Green Skateboard in front of the skateboard press.

Cornell is now seeing its licensed composite technology become a reality with the commercial production of the "green" Comet boards. The University has also partnered with e2e Materials, a clean technology company, which produces the petroleum-free, biodegradable composites used in manufacturing the new Comet skateboards.

Future applications for Cornell's "green" composite technology are expected to include furniture, cabinetry, trade show booths, building materials, shelving, doors, modular walls, action sports, and automotive. All of these are being developed at e2e Materials.

Netravali stated, "Future goals are to develop stronger eco-friendly composites that also can withstand high temperatures, which will significantly expand the potential applications."

For more information on "green" composites, contact Anil Netravali at 607-255-1875, or ann2@cornell.edu. ✦

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