

# Eco Textiles Efforts



VTT Technical Research Centre of Finland Ltd., is advancing the success of bio-based research with its innovative wood fiber Spinnova Yarn technology. The sustainable Spinnova method develops yarn filaments directly from wood fibers, and is now producing bio-based finished apparel from spruce and pine fibers without the need for chemical processing.

The VTT Technical Research Centre is the leading research services organization in the Nordic countries, and has a national mandate in Finland. VTT uses its technical knowledge to provide expertise for domestic and international customers in both the private and public sectors. Its research solutions provide a competitive edge that paves the way for future smart technologies, like Spinnova Yarn, to partners all over the world.

**For More Information**

Spinnova Yarn and VTT Technical, Finland. Janne Poranen, CEO, Spinnova: janne.poranen@spinnova.fi, 383-400-138-711.

“The original idea for Spinnova Yarn dates back to 2011 when Juha Salmela, Spinnova co-founder and CTO, attended a spider silk presentation at Oxford University,” explains Janne Poranen, Spinnova co-founder and CEO. “The seminar was focused on the way spiders spin their silk, and the similarities between spider silk protein and nano-fibrillated cellulose.”

Salmela, whose background at VTT was in Finland’s pulp and paper research, came up with the idea to combine papermaking and nano-cellulose rheological properties (the deformation and flow of matter) to start producing yarns directly from wood fibers, just like spiders spin their silk. Poranen, who at the time worked as a research manager at VTT, joined Salmela in starting a new company, Spinnova Ltd.

**The Technology**

“Our technology uses the same raw material, pulp fibers, that are used for paper making,” says Poranen. “The pulp is refined to fibillate (split up into fibrils) the fibers and rheology of the water-fiber suspension is adjusted so the long wood fibers can go through small nozzles without clogging the holes.”

Inside the nozzle, the fibers are oriented with the flow. As the yarn dries, strong chemical bonds between the fibers hold the yarn together. The Spinnova technology uses no dissolution chemicals to dissolve wood fibers to polymers, and then regenerate them back to cellulosic fibers. Poranen notes, “In our



technology, all the good properties that nature has created in wood fibers are used as the building blocks for the Spinnova Yarn.”

During testing, the Spinnova Yarn is evaluated for normal tensile strength, dye susceptibility, fire-retardancy, water absorption, abrasion-resistance, wash durability, and the yarn’s bend strength before and after washing. Test results vary depending on the type of yarn produced. The Spinnova Yarn production can range from 1dTex fiber to a 30 Tex monofilament.

Spinnova Yarn production is cost-effective and provides other major environmental benefits. Spinnova is 100 percent recyclable, uses 99.5 percent less water and 80 percent less energy than cotton production, and is 60 percent cheaper than cotton.

**Spinnova Applications**

Currently, Spinnova owns five international patents. Along with its Finnish partner, Melli EcoDesign, an infant apparel manufacturer, Spinnova is producing test t-shirts as its first application, which is receiving very positive feedback. Future Spinnova applications will focus on home textiles and technical textiles. An important driver for these applications is the natural fire-retardant quality of the Spinnova Yarn. The company is also developing soft and strong fibers, which can be used for other apparel products and may advance other applications.

“Our Spinnova Yarn has very interesting and controllable water-absorption properties, which may open several opportunities in medical applications,” states Poranen. “Bio-degradable composites are another possible use, and we are also developing non-woven applications.”

The long-term goal for Spinnova is to obtain financing to scale production to 300 tons annual capacity. Poranen states, “We want Spinnova Yarn to be truly sustainable globally as a cost-competitive alternative to cotton and oil-based yarns. We are looking for industrial partners to join this development.” ●

Kathlyn Swantko, president of the FabricLink Network, created TheTechnicalCenter.com for industry networking and marketing of specialty textiles, and FabricLink.com for consumer education involving everything fabric.

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