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REGENERATED CELLULOSE FIBRES FOR STRUCTURAL COMPOSITES

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This presentation will review the on-going research at University of Borås regarding development of novel textile reinforcements from regenerated cellulose fibers which can be used in structural composites.

Many annual plant fibers, for example hemp, jute, coir and flax, have been studied and developed for the use in composites. These fibres are first retted or mechanically treated, and then the obtained fibres are carded and spun into staple fibre yarns. Woven fabrics can then be made by conventional textile processing techniques. Although the mechanical properties related to the density of these plant fibres are rather good, and even competitive with the heavier glass fibers, their use is still minor, due to the lack of high quality fibre sources which can be converted into reinforcements.

An alternative to annual plant fibres is the regenerated cellulose fibers, (Rayon, Viscose and Lyocell), which are industrially produced in large quantities as continuous yarns. Their chemical purity is high with pendant hydroxyl-groups, and they can be therefore easily modified chemically to improve the compatibility with the matrix resin.

The paper will especially discuss the possibilities to manufacture hybrid yarns and hybrid reinforcements by combining different fibre types into textile structures. The techniques to manufacture these reinforcements by co-wrapping, staple spinning and carding will be described. Both thermoset and thermoplastic composites have been evaluated. The possibilities to tailor the mechanical properties and processability as well as their use in composite applications will also be demonstrated. The effect of chemical modification will also be described. The composites were made by compression moulding and vacuum infusion and their mechanical and thermal properties have been evaluated and compared to conventional reinforcements.