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New concepts for recycling of construction and demolition wood waste

Construction and demolition (C&D) wastes arise from renovation, construction, and demolition of buildings, roads, and bridges. Recycling of these materials is an essential component of sustainable building by reducing environmental impact of materials production, saving landfill space, reducing degree of incineration, and offering a raw material base for new materials. Together with three SME partners, VTT develops and demonstrates novel cost-effective solutions for a higher recovery of C&D wood waste.

VTT is cooperating with three Finnish SME partners; Conenor Oy, KS Laatuenergia Oy, Tiihonen Ismo, to produce high-quality wood fractions and fibers from C&D waste and manufacturing of fibre-plastic composites and gypsum plasterboards based on C&D wood waste.

The first batches of wood fractions from different types of construction and demolition wood waste were successfully prepared during the summer 2015; see the top figure on the right. The waste was sorted into four different categories according to origin and purity: clean wood fraction, painted wood fraction, plywood fraction and fibreboard fraction. The wood fractions were first broken down to components with a pre-crusher. Still down-sizing the particle size, the wood components were pre-refined by disc refiner into a material that is shown in the middle image. The particle size of various wood fractions was homogenized by post refining with various size screens. In autumn 2015, several wood/polypropylene and wood/polyethylene extruded composites with different compositions were made for testing (see the bottom figure).

In the following phases, the process is optimized by integrating material pre- and fine-crushing, sorting and cleaning into one system that effectively separates impurities, classifies the cleaned raw material into desired fractions, and refines the fractions to a desired particle size. The performance of products based on C&D wood waste will be verified in demo buildings.

This work is being done in the HISER project* which has received funding from the European Union. The aim of HISER is to develop and demonstrate novel technological and non-technological cost-effective holistic solutions for a higher recovery of raw materials from ever more complex C&D waste by considering circular economy approaches throughout the building value chain.

The project covers all stages in management of C&D waste, starting from demolition using new tools for building information modelling (BIM) and ending with demonstration of new technologies in case studies. An environmental and economic assessment will be made on the solutions. VTT is involved in development of both BIM tools and wood recycling.

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Images:

Top figure shows waste wood raw material source (KS Laatuenergia Oy), middle image pre-refined wood material (Tiihonen Ismo), and bottom image composites extruded from C&D wood fractions (Conenor Oy).

* EU H2020 HISER project: Holistic Innovative Solutions for an Efficient Recycling and Recovery of Valuable Raw Materials from Complex Construction and Demolition Waste (2015-19). www.hiserproject.eu



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