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THE ADDRESS FOR WOOD RESEARCH

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WASTE WOOD RECYCLING





The challenge of wood supply

The increase in the use of various wood species as combustion fuel represents a great challenge for the wood-based panel industry. The German particleboard industry alone has an annual requirement of around 4 million tons and the proportion of this which is recycled wood is 33 percent. The current German Ordinance on Waste Wood only allows certain kinds of waste wood to be used for recycling (categories A I, A II and to a limited extent A III). These include pallets, packaging or furniture without coatings or wood protection products. As it is currently almost impossible to separate the wood waste effectively enough, even high-quality woods are often destined for combustion. The Fraunhofer Institute for Wood Research WKI is therefore developing new process concepts to allow recycled woods to be used more efficiently.

“Cascading” usage model

Prerequisite to cascading usage is correct classification of waste wood types or specific pieces of waste wood. The Fraunhofer Institute for Wood Research is focussing on the development or adaption of detection methods followed by preparation of the wood by chipping and separation. Not only the wood can be considered as a strategically important source of raw materials for the future - the coating materials and their ingredients can also be reused. The aim is to optimize the separation efficiency of these recyclables in order to greatly improve the yield.

Current research topics

- Gaining chips and fibres from wood waste from industry, waste furniture and other waste which contains wood
- Gaining chrome, copper, boron, titanium dioxide and white lead
- Ascertaining the active ingredients used in wood protection products
- Developing
 - new separation methods in a continuous process
 - more new detection methods
 - more efficient decomposition methods
 - analytic methods for detecting chemical impurities

Currently available devices

- Thermography cameras (LWIR, MWIR, Dual-Band)
- Spectral imaging test bench (NIR)
- Various camera and spectroscopy systems
- Emissions measurement device for reflective materials and an infrared spectrometer
- Wood-based materials technical centre with a full range of preparation and reprocessing technologies
- NIR-sorting system
- Field asymmetric-waveform ion-mobility spectrometer (FAIMS) for the detection of organic wood preservatives

Topics for the future

- Creating processes for separating substances in products with coatings, protection products, binding agents, adhesives etc.
- Manufacturing cellulose and wood-based materials from previously unused types of waste wood
- Recycling wood-polymer composites (WPC)
- Increasing the amount of usable waste wood for producing wood-based panels and other products from renewables
- Lignin derivatives for coatings and adhesives

Technologies for the future

- X-ray fluorescence technology (XRF)
- Proton transfer reaction mass spectrometer
- Ion mobility spectrometer (IMS)
- Laser-induced breakdown spectroscopy (LIBS)
- Use of high-energy electromagnetic waves for new ways to separate wood into its component parts
- Reducing wood following hydro-thermal preparation
- Mechanical and chemical separation processes as a preliminary step to material recycling