Wood-plastic-composites based on thermoplastics such as polyolefin (PP, PE) and polyvinylchloride (PVC) are well known and established on the marked since many years. The main drawback of this type of composites is their low impact resistance and low elongation at break. These properties cause many problems in various applications. A potential solution to overcome these problems is the use of matrix material which has elastomeric properties. Thermoplastic polyurethane (TPU) belongs to the group of thermoplastic elastomers and exhibits both elastomeric and thermoplastic characteristics. At room-temperature TPU behaves as an elastomer, but it melts at higher temperatures enabling WPC-processing-techniques. TPU itself shows extreme high impact strength and hence is often utilized as an impact modifier (e.g. for POM, PVC, PC und ABS). Because of its chemical constitution it is expected to have a good compatibility to wood.

The processing abilities and the properties of TPU based wood composites have been investigated. This study includes two different types of TPU (based on polyether or polyester), two kinds of wood particles with different grain sizes and wood content varying from 10% to 50%. The composites were manufactured in a two-stage process (compounding followed by compression molding). Specimens were tested subsequently by means of mechanical properties tensile, impact, hardness and abrasion as well as water uptake and swelling.

The composites exhibits exciting properties compared to polyolefin based WPC. Modulus and hardness depends on type of TPU, but increases with increasing amount of wood. Impact bending measured using notched-specimen was higher as in polyolefin. Especially the elongation at break showed very high values. Strength and abrasion resistance decreased with increasing wood content. The composite exhibited a significant water uptake during 28 days of water submersion. The overall properties show that this composites exhibit a different characteristic compared to traditional polyolefin based composites. New products with high impact resistance can be made from it.