

Weathering-resistant powder coating of WPC – challenges and results

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Weathering resistance is still a weak point of natural fibre composites (NFC) and wood polymer composites (WPC). Additives like hindered amine light stabilizers (HALS), UV absorbers and antioxidants helps to improve the durability, but have a crucial influence on the material prize. An alternative could be powder coating. With this durable, eco-friendly, resource-efficient and economical coating technology, the added value of NFC/WPC could be increased.

For that some current technical challenges has to be mastered. One is the high electrical resistivity ($> 10^{12} \Omega$) of NFC/WPC, because a prerequisite for powder application/coating is a conductive substrate with an electrical surface resistance below $10^6 \Omega$. Another one is the adhesion between the powder coating and the substrate.

Therefore, conductive carbon black, carbonized wood flour and multiwall carbon nanotubes (MWCNT) were tested as enhancer for the electrical conductivity of PP-based wood polymer composites. Furthermore, their influence on the mechanical, physical and thermal properties was investigated. To improve the adhesion, plasma treatment was used, too.

The analysis of the results showed a significant reduction of the electrical resistivity. All conductive additives led to an increase of the density and a decrease of the impact resistance. The addition of the MWCNT increased the tensile and bending properties as well as heat deflection temperature. In comparison to un-coated NFC/WPC, the CIELAB colour difference of powder coated samples after an artificial weathering of 1500 hours is negligible. To sum up, it can be said that the modification of PP-based WPC with conductive additives enables to apply powder coating and increases in further consequence the weathering resistance. Considering that, the slight loss of some properties could be accepted.