



## WOOD PLASTIC COMPOSITES

*Wood plastic composite products are increasingly being tipped for market growth. Morwenna Spear of Bangor University's BioComposites Centre takes a look at the material*



Wood plastic composites (or WPCs) have become an established alternative product to solid timber in the decking market, since their introduction in the 1990s. A recent report by the Nova Institute placed the European market for WPC decking and cladding at 190,000 tonnes and projected a potential increase to 400,000 tonnes by 2020! Perhaps this is an opportune moment to look again at this material. After all, it serves

as a potential market for sawmill co-products (sawdust, planer shavings and the like) and allows product diversification within the forest products sector.

WPCs are composite materials, formed from a blend of plastic and wood flour, or occasionally wood fibre. The plastics may be polyethylene, polypropylene or occasionally polyvinyl chloride, in this case usually as a new material in the window frame market – now with extra wood.

The reason for this selection of polymers is their relatively low melting point, which allows them to be blended with the wood without scorching or altering the wood flour particles. As technology has improved, and in particular for the automotive market, newer blends have also emerged, for example using special formulations of low melting point nylons (polyamide-11) or acrylics (PMMA). This offers a large shift in mechanical performance, and some increase in resistance to temperature in service, for example allowing components to be used nearer to the engine or exhaust of the car.

In practice, the WPCs with PE, PP and PVC matrix polymers are the ones most likely to be seen in plank form competing with solid wood, for example the WPC extrusions for cladding and decking. The planks and profiles are made by extrusion, a process of melting the polymer to allow mechanical blending of the wood flour and additives (e.g. pigment, protective agents, UV stabilisers). As this molten mixture of polymer and wood flour passes through the barrel of the extruder it is mixed and blended under shear before exiting through a profiled die. The die of the extruder can be selected to offer different profiles, either solid or hollow, or with pre-formed ridges for low slip or tongue and groove. This has led to the interest in easy installation, low waste, and of course the opportunity to use wood by products (sawdust, shavings etc) in the product.

Extruded profiles of WPC are well suited to decking, cladding and other non-structural uses. The bending strength may be almost as good as wood, but great effort goes into designing profiles which reduce weight, as the material is typically heavier

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than most hardwoods. We are unlikely to see it in load bearing components, e.g. the WPC decking should be installed onto a structure formed from a different material.

The WPC industry has seen rapid growth over the past 15-20 years, and a large number of companies have come (and gone) with new investment in different regions of the world. Within Europe and North America the early-established companies have learnt a lot of lessons along the way, and the industry has developed a set of standards to improve the performance, and the reliability, of the product.

This may not be the case with all suppliers. One example is the German based *Qualitätsgemeinschaft Holzwerkstoffe* scheme which requires testing of a wide range of properties to meet strict criteria for performance.

The message is simple, WPC materials offer many benefits for the customer, but the product they select must be up to the job. By ensuring we are well informed about the quality of the products we offer, and the installation guidelines, WPCs can be used alongside traditional wood to offer a low maintenance hardwearing option. ■

*Below:*  
WPC decking  
PHOTO: MEGAWOOD



**The Wood Technology Society**

A Division of the Institute of Materials, Minerals and Mining