

Information Paper

Natural Fibre Reinforced Polymers (NFRPs) in the construction industry

Julie Bregulla

Fibre reinforced polymer construction products are being used increasingly in the construction industry. The construction industry is one of the largest users of Fibre Reinforced Polymers (FRPs), second only to the automotive industry.

This Information Paper reviews the potential for natural products in construction materials, specifically fibre reinforced composites including various natural fibres, such as hemp and flax. It discusses their specific benefits and the factors that are influential to their wider utilisation.

Introduction

The construction industry is the largest single economic activity in Europe. It is estimated to account for 45% of Europe's energy consumption^[1]. Construction products and associated services contribute 450 bn turnover per year (estimated). The materials they use, their manufacture and transport make a considerable contribution to the overall energy consumption of the construction industry. In the UK, 15% of CO₂ emissions are estimated to be related to the production of construction materials^[2].

Fibre Reinforced Polymers (FRPs) construction products are used increasingly in the construction industry. In FRP composites a polymer resin (also called 'matrix') is reinforced with fibres. The most commonly used fibres are glass and carbon, the most commonly used resin is thermoset epoxy or polyester-based. The fibres are combined in the matrix to a homogeneous material, which transfer the stresses in composition. Increasingly glass and carbon fibres are being replaced with natural fibres.

The construction industry is one of the largest users of FRPs (specifically Glass Fibre Reinforced Polymers – GRPs), second only to the automotive industry. FRPs have been used in UK construction for several decades (Figure 1).



Applications include electrical fittings, roofing, flashing, cladding and decking, canopies, windows and doors (Figure 2). FRPs are also used in structural applications such as beams and local reinforcement. Due to their light weight, FRPs can contribute to savings in transportation. They can also be moulded into complex shapes, giving new design possibilities and they offer a combination of properties not available in traditional materials.

Natural Fibre Reinforced Polymers (NFRPs) have been identified as a potential lower impact alternative to GRPs. Until recently GRPs have been more economically viable than NFRPs; however, with increasing emphasis on low embodied impacts, natural fibres have become a realistic alternative to glass fibres.

The acceptance of NFRPs in the construction industry will depend on their proven performance in use and regulatory compliance, their economic viability and the confidence with which structural and architectural components can be designed.