

The usage of Polymer-based materials in Civil Engineering

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Abstract

This paper aims to show the advantages and disadvantages of the usage of polymer materials. The properties will be demonstrated in the experiment designed in the Laboratory of Excellent Research at the Technical University of Kosice, which cooperates with the faculty of civil engineering. Materials based on polymers are often used in the world, for example in mechanical engineering, aeroplanes structures, prosthetic medicine, etcetera. The effective adoption of polymer materials in civil engineering is important. These materials have properties such as corrosion and humidity resistance, and flexibility, while at the same time maintaining their physical form. They can provide all this at 10% of the weight compared to steel.

Keywords: FRP material, composite bridges, corrosion resistance, GFRP concrete bridge.

1 Introduction

This article will address the advantages and disadvantages of FRP materials in construction. Based on some facts gathered from previous research at the Centre for Research and Innovation in Construction, the characteristics and behaviour of FRP materials in civil engineering were identified. This article will show some of the results of the research as well as a comparison with steel.

FRP materials are materials that are greener, more sustainable and more resistant to materials currently used in construction. Their properties and characteristics are comparable to those of steel since their most common use in construction is precisely the replacement of steel elements. This is justified by the fact that steel is a mineral raw material that needs to be extracted and

subsequently processed. Their current competition in FRP materials has a past in the 1980s and combines the properties of the elements needed to achieve the necessary resistance in construction structures.

The article is aimed at describing certain types of FRP materials used simultaneously in construction as well as the possibility of being used in engineering structures such as bridges or fastened ceilings.

Fibres in FRP materials may be based on different materials such as carbon, tungsten, glass, udder, boron, molybdenum, beryllium, etc. There are also matrices from different types of epoxides and polymers. One of the advantages, however, is often also the disadvantage of such composite materials, their anisotropic properties, which in some cases