

A STATE OF THE ART REVIEW INTO THE USE OF GEOPOLYMER CEMENT FOR ROAD APPLICATIONS

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ABSTRACT

This paper is a state of the art review of the use of geopolymer cement for road applications. Geopolymer cement is an alternative to Portland cement and is either naturally occurring rock-based or industrial by-product-based. Geopolymer cement has been around for at least the last 30 years. In recent years it has become an attractive potential alternative to Portland cement. The main reason for this renewed interest is the issue relating to the release of carbon dioxide into the atmosphere during the manufacture of Portland cement. It is estimated that 1 tonne of Portland cement produces approximately 1 tonne of CO₂ during its manufacture. The use of geopolymer cement can reduce this amount by as much as 90%. It is claimed that this will have a huge potential in reducing national targets in CO₂ emissions of many countries around the world. This state of the art review critically evaluates existing literature relating to these claims and focuses on the potential use of geopolymer concrete for road applications. In addition to environmental benefits, the existing literature suggests that geopolymer cement concrete has the potential to provide better mechanical properties than Portland cement concrete. Attractive properties include quicker compressive strength development, higher compressive and flexural strength, minimal shrinkage and resistance to chemical-attack and freeze-thaw cycles. The review will consider the different types of geopolymer cement, its properties and whether it can be used in road applications.