Application of Recycled Steel Fibre in Malaysia: A Review

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Abstract. The amount of waste tyres is expected to increase with the surge of vehicle ownership in Malaysia as tyres are vehicle vital components that require regular replacement. The improper disposal of waste tyres has generated environmental issues. Energy recovery through burning, recycling, and disposal in legal and illegal landfills are common methods in disposing of waste tyres in Malaysia. Studies show that waste tyres contain steel fibre that can be extracted and has the potential to be used in construction. In Malaysia, existing methods of material recovery are shredding and pyrolysis. The steel retrieved from waste tyres exhibits good adhesion with mechanical strength recorded up to 2165 MPa and a modulus of 300. However, the uneven shape, length, and geometry can lead to a balling effect when incorporated into concrete but with a proper mix proportion this issue can be managed. Addition of recycled steel fibre to concrete can enhance its structural strength and crack-bridging effect while the use of recycled steel fibre in hot mix asphalt can enhance its tensile strength and toughness. The utilisation of steel recovered from waste tyres presents an opportunity to address environmental concerns related to waste tyre disposal and its potential applications.

1 Introduction

Car ownership has shown a major increase in the recent year. As of the year 2021, the Ministry of Transportation Malaysia has reported a total of 33 million registered vehicles in Malaysia [1]. Tyres are required to be replaced after reaching their end of life. Due to the increased production and sales of vehicles, a significant quantity of waste tyres is expected to be generated [2]. The disposal of old tyres has raised concerns over the environment and public health, and studies have been done on the appropriate methods for their disposal [3]. The Malaysian Association of Tyre Retreaders & Dealers Societies (MATRDS) has addressed the issue of tyre dealers in Malaysia facing the problem of managing waste tyres due to recycling factories refusing them while the authorities ban the disposal of waste tyres in landfills without providing alternative solutions [4]. In Sabah, stern actions have been taken by the authorities for the illegal disposal of this material as it would create a breeding

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