

Chapter 1

Waste Tyre Rubber Application in Semi-Rigid and Flexible Pavement


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ABSTRACT

Increasing traffic requires durable and low-noise road surfaces. Urban residents complain about excessive traffic noise that leads to an unhealthy environment. Understanding techniques to produce durable, low-noise pavement has led to the development of rubberized concrete block pavement (RCBP) and rubberized asphalt concrete pavement (RACP). The chapter examines morphology and chemical properties of waste tyre rubber using FESEM, XRF, and TGA/DTA. Authors discuss characteristics of RCPB and RACP and conclude application of RCBP and RACP can lower traffic noise.

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INTRODUCTION

In view of a conventional waste management system, waste tyres are basically either disposed in the landfill or burned. Tyre stockpiles caused severe health problem to human due to mosquito, vermin, and rats breeding. Fire hazard from the tyre burning activity also can cause uncontrollable burning and air pollution. However, tyre disposal and burning in landfills are banned in most countries (Martínez et al., 2013). According to Shah (2006), the current “conservation of natural resource concept”, i.e. the reuse (retread) first, then reuse of rubber prior disposal, does not accommodate the ever-increased dumping of tyres. Due to the high cost of legal disposal for tyres, illegal dumping may increase. Disposal of tyres is becoming more expensive, while this trend is likely to continue as landfill spaces become insufficient. Tyres take up landfill space.

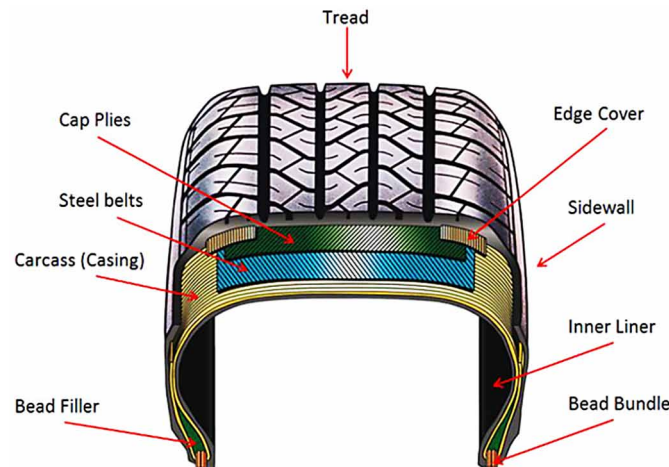
The challenge of scrap tyre management arises mainly from the technical and commercial issues relating to tyres both as a product and as a waste. What is tyre? Tyres are made of materials including synthetic and natural rubber, textiles, steel, carbon black, aromatic extender oils and various chemical additives, which are “vulcanised” at a high temperature during the manufacturing process (Chemsain, 2011). The main components of car and truck tyre as shown in Figure 1 is particularly a stable product that requires a great energy to properly break the material down to useful product. In this chapter, we’ll look into the component of a tyre, the chemical and physical properties, waste tyre management, and waste tyre application in pavement industry.

WASTE TYRE MANAGEMENT APPROACH

Waste tyres are managed in various approaches to ensure the by-product can be used as a new energy sources or produced as new material. Szentannai *et al.* (2015) and Lopez *et al.* (2017) investigated ways to reclaim the virgin components and recover energy and new materials from waste tyres through the high technology oriented and excessive heat processes such as the de-vulcanisation, pyrolysis, gasification,

Figure 1. Components of a tyre

Source: <https://kitchendecor.club/files/radial-tire-cross-section.html>



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