

Chapter 1

Waste Tyre Rubber Application in Semi-Rigid and Flexible Pavement


Euniza Jusli

University College of Technology Sarawak, Malaysia

Hasanan Md. Nor

Universiti Teknologi Malaysia, Malaysia

Ramadhansyah Putra Jaya

 <https://orcid.org/0000-0002-5255-9856>

Universiti Malaysia Pahang, Malaysia

Zaiton Haron

Universiti Teknologi Malaysia, Malaysia

Mastura Bujang

University College of Technology Sarawak, Malaysia

Wan Nur Aifa Wan Azahar

International Islamic University Malaysia, Malaysia

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.

DOI: 10.4018/978-1-7998-0369-0.ch001

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.

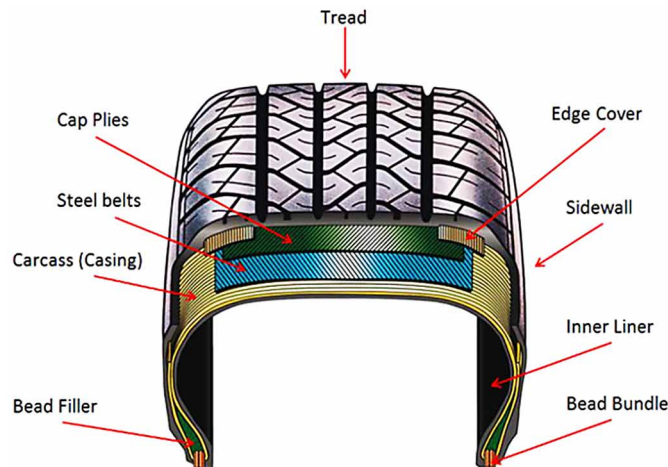
The challenge of scrap tyre management arises mainly from the technical and commercial issues relating to tyres both as a product and as a waste. What is tyre? Tyres are made of materials including synthetic and natural rubber, textiles, steel, carbon black, aromatic extender oils and various chemical 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>



19 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/waste-tyre-rubber-application-in-semi-rigid-and-flexible-pavement/242008

Related Content

Micro/Nano-Plastics Pollution: Challenges to Agriculture Productivity

Nandini Arya and Atin Kumar (2025). *Global Impacts of Micro- and Nano-Plastic Pollution* (pp. 205-224).
www.irma-international.org/chapter/micronano-plastics-pollution/357416

Dynamic Characterization of Settled Pond Ash Using Measured Shear Wave Velocity (V_s) and SPT-N Values: Correlation Between V_s & N

Ravi Sankar Jakka, B. Janaki Ramaiah and G. V. Ramana (2011). *International Journal of Geotechnical Earthquake Engineering* (pp. 83-97).
www.irma-international.org/article/dynamic-characterization-settled-pond-ash/52788

Biological Nutrient Removal by Suspended Growth Systems

Ezerie Henry Ezechi, Augustine Chioma Affam and Khalida Muda (2020). *Handbook of Research on Resource Management for Pollution and Waste Treatment* (pp. 264-293).
www.irma-international.org/chapter/biological-nutrient-removal-by-suspended-growth-systems/242019

Air Pollution Control and Green Chemistry Solutions

P. Selvakumar, Nikitha Sreekanthaswamy, Anubhav, Santosh Kumar Nathsharma, Satyajit M. Deshmukh, A. Revathi and T. C. Manjunath (2026). *Sustainable Chemistry and Pioneering Green Engineering Solutions* (pp. 17-46).
www.irma-international.org/chapter/air-pollution-control-and-green-chemistry-solutions/384695

Dynamic Response of Different Types of Shallow Foundation over Sandy Soils to Horizontal Harmonic Loading

Taha Ashoori and Keivan Pakiman (2015). *International Journal of Geotechnical Earthquake Engineering* (pp. 1-14).
www.irma-international.org/article/dynamic-response-of-different-types-of-shallow-foundation-over-sandy-soils-to-horizontal-harmonic-loading/134040