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Review

A literature review on cold recycling technology of asphalt pavement

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HIGHLIGHTS

- Cold recycling technology has obvious advantages but needs further investigation in details.
- CIR method eliminates distresses, saves cost and energy and reduces project period.
- Bitumen and cementitious stabilization agents are two main categories used in the construction.
- Empirical and analytical designs are two major cold pavement design methods.
- A series of laboratory and field test technologies are indispensable to characterize the material properties.

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ABSTRACT

Due to the advantages of less raw materials and fossil fuel consumption, lower carbon footprint, and the capability of pavement performance improvement, the recycling technology of asphalt is developed and applied for road rehabilitation and construction in the western countries over the past two decades. However, some technical problems still need to be concerned about, for instance, the techniques in recycling process and the optimization of mix design. In order to promote the application of cold mixing technology in practice widely, and better follow up the research progress of cold recycling technology, this paper reviewed and discussed the classification of cold recycling, the scope of application, raw materials, mix design procedure and construction technology, test method, pavement performance.

Contents

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1. Introduction

As we all know, the development of road industry have made many achievements, especially in the highway engineering. However, due to the low level of technical process, lack of good quality materials, the unreasonable pavement design method, and the bad construction quality control and so forth, the early built asphalt pavement was damaged seriously and different types of distress occurred such as rutting, cracking, moisture damage, corrugations & shoving, pothole, raveling, bleeding etc. Therefore, it is of significance to construct sustainable asphalt pavement because of the globally ever-increasing expansion of road transportation systems [1–4].

Moreover, with the rapid development of modern industry, the huge consumption of traditional energy resources, especially petroleum, leads to the severe energy crisis and environmental issues. Above all, seeking alternative pavement materials and initiative construction technology to maintain an efficient, safe and cost effective pavement system has become an urgent task for government departments, academic community as well as construction contractors.

In recent years, due to the obvious rehabilitating existing pavements advantages, great attention have been paid on recycling technology [5,6]. Generally speaking, recycling technology has the virtue of consuming less raw materials and fossil fuel, lower pollutant emissions, and improving the pavements performance [7–11]. From a historical point of view, recycling techniques have developed rapidly in the countries including the United States, Canada, France, Germany, Spain and Australia. In Spain, for instance, the recycling of asphalt pavement has been used over a decade. Moreover, it has been used worldwide because of its potential to alleviate the serious pollution issues, prolong the life cycle of pavement and save the construction cost [12–14].