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STRUCTURAL AND ENVIRONMENTAL ASSESSMENT OF HIGH-PERFORMANCE ASPHALT MIXES WITH A HIGH RECLAIMED ASPHALT PAVEMENT CONTENT: A CASE STUDY

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Abstract

Nowadays, attention in the construction sector is increasingly turning towards the concept of sustainability, efficiency and durability to reduce atmosphere emissions. The A4 Turin-Milan motorway is pushing in this direction. In particular, from the pavement point of view, one of the most important innovations introduced by the road manager is the study of bituminous mix with about 70% of reclaimed asphalt pavement (RAP); this methodology is today possible thanks to the use of rejuvenating agents, the implementation of next-generation asphalt plants, and the introduction of a graphene-enhanced polymeric compound (GPC), through which it is possible to obtain high-performance asphalt concrete (up to +75% of service life) with a consequent reduction in future maintenance if compared to the existing pavement. The new technology was experimented first in the construction of a 1 km long trial section at the end of 2022. With the aim of validating the Life Cycle Assessment (LCA) and Life Cycle Cost (LCC) analyses prior to the production of the mixtures, laboratory and field tests were carried out specifically aimed at assessing the structural characteristics of the mixtures. Mixtures used were previously tested in the laboratory and showed an increase in the average stiffness and strength values at 20 °C and 25 °C up to 50% compared to average values of traditional mixes. From the time of construction, the trial section is being monitored visually as well as by Falling Weight Deflectometer (FWD) tests. The results obtained in the first 500 days of life seem to be promising compared to the assumptions made for the LCA and LCC analyses (10% less deflection when compared to materials traditionally used by the road operator). In fact, a very stable and effective behaviour of the new pavement under relevant traffic loads could be recognized.

Key words: asphalt concrete, graphene-enhanced polymeric compound, service life, sustainability, rejuvenator

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