

INNOVATIVE MATERIALS FOR PAVEMENTS IN TRANSPORTATION INFRASTRUCTURES

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KEYWORDS: pavements, recycling, End-of-Life Tires (ELT), Construction and Demolition (C&D), geopolymers

The growing global awareness on the reduction of impacts on the environment is directing the pavement engineering research towards the use of eco-friendly materials also in the construction of transportation infrastructures. Sustainability applied in this field to the design and production of construction materials, finds its basis in the recycling of resources that, otherwise, will be dumped. In parallel, new binders, mixtures and technologies have widened the spectrum of recycling applications for those wastes that only few years ago were not used in green pavements.

The Pavement Engineering section of DICAM proposes researches addressed to Practitioners, Authorities and Companies that operate in the field of transportation infrastructures, providing technical solutions aiming to the production of recycled and low impacting materials with high durability and mechanical performances.

Studies started several years ago and have led to the definition of admixtures to be successfully adopted in the construction and maintenance of transportation pavements. These innovative materials have equivalent or better performances when compared to traditional ones and in some cases lower overall costs.

Cold mixed asphalt concretes (Cold mixes) and AC produced at intermediate temperatures (Warm mixes) containing End of Life Tires (ELT) rubber are green solutions that overcome the issues related to the incorporation of crumb or fine rubber into bituminous materials.

The use of Dynamic Shear Rheometer (DSR) for the optimization of mastics and mortars has reduced the amount of lab-work and enabled the development of high performance mixtures starting from the binding phase rheology.

Alternative fillers have been studied for the recycling of waste bleaching clays from the food industry processes. Research on this topic has shown that not all clayey materials have negative effects on the mechanical performances of bituminous bound and cement bound mixtures for pavement layers. Similarly the use of Construction and Demolition recycled aggregates, among which Reclaimed Asphalt Pavement, was

proven to be a viable solution to avoid dumping and landfilling.

New frontiers of research are those of using alternative binders and cements such as alkali-activated or geopolymerized precursors for the production of artificial engineered aggregates, paving blocks and entire pavement layers.



Fig. 1. Dynamic Shear Rheometer testing on rubberized bituminous mastics.



Fig. 2. Artificial engineered aggregate made of alkali-activated waste materials.



Fig. 3. Recycled waste bleaching clays (dark brown) in an asphalt concrete aggregates gradation.

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RESEARCH PROJECTS

Research Project Agreement between DICAM and Cooperativa Trasporti Imola srl: Design of cement bound mixtures for pavements layers containing RAP. 2016.

Research Project Agreement between DICAM and LUCOS srl. Study for the production of eco-asphalt concrete made with warm mix binders and aggregates from waste and recycled materials. 2015-2016.

Research Project Agreement between DICAM and Ecopneus Scpa. Advanced characterization of bituminous binders with enhanced performance and containing rubbers from PFU. 2014-2016.

Research Project Agreement between DICAM and SAPABA SpA: Study of wearing course bituminous mixtures containing ELT for urban pavements. 2015-2016.

Research Project Agreement between DICAM and Unigrà SpA. Promotion of byproducts for the performance modification of bituminous binders and mixtures for road infrastructures. 2013-2014.

European Project H2020-MSCA-RISE-2014: Re-use of mining waste into innovative geopolymeric-based structural panels, precast, ready mixes and in-situ applications (REMINE). 2015-2018.

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