

Title: Evaluation of the behavior of different tracks of a road rehabilitated with hot bituminous mixtures

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Abstract

Pavement rehabilitation using enhanced recycled asphalt mixtures started to be developed in the early seventies in USA, fostered by the petroleum crisis, which raised strong concerns on both the energetic sustainability issues and on the main fields of application of the petroleum based products, such as the bitumen. This historical reasoning behind the interest on this procedure has, however, lost most of its sense since then, given the worldwide decrease verified on the petroleum prices, and thus on its based products

Notwithstanding, an increased environmental conscience amongst road administrators in the last years has promoted once again the recycling techniques and has hindered the disposal of road construction waste. Furthermore, the lack of aggregates of adequate quality in some areas has fostered the development of such recycling procedures.

Although there are several techniques to recycle the material reclaimed of the concrete pavement, the hot-in-plant recycling procedure is the one that has the biggest potential of development because of its high capability of material re-use, the final product quality and the environmental advantages. These advantages had pushed the constructor companies to invest in hot-in-plant machinery and to increase the machinery stocks to mill the old bituminous mixtures.

The main problem is the lack of specific standards to test and to design hot-in-plant recycled mixtures. At present, it is used the same criteria that applies to conventional mixtures. Envisaging to establish a new methodology allowing to guarantee a suitable performance of the recycled mixtures, the Road Technology Laboratory of the Transport Engineering Department of The Universitat Politècnica de Catalunya is currently carrying on a comprehensive research programme approaching a complete mechanical characterization of the different sorts of hot recycled mixtures. More concretely this study, until it is developed at ETSECCPB, is inside the project called Paramix. The PARAMIX project is financed with public funds, with charge to the European community and his objective is the study of the improvement of materials, design and techniques for rehabilitation of road's pavements, using bituminous mixtures of asphalt recycled pavement.

Although the PARAMIX project includes the study of all type of recycled material, like cold recycled in situ with emulsion, or hot in-plant recycled reinforcement, in this thesis, we only analyses the utilization of the second one, hot in-plant recycled reinforcements in experimental tracks along the C-58 road.

In this study we will carry out a characterization of the bituminous mixtures recycled in hot in plant used in the diverse structural rehabilitations, by means of the study of test tubes and testimonies, which we will make the assays of indirect traction, resilient module and dynamic compression module.

The realization of the assay of indirect traction, will allow us to compare the results obtained by the extracted testimonies of the road, and therefore executed in situ, with the results obtained by the test tubes created in the laboratory. Therefore, we can know which is the variation of the resistance among the test tubes created in the laboratory with the extracted testimonies of the road which present execution conditions considerably different to those of laboratory. For another band, the obtaining of the modules by means of the resilient assay and dynamic compression, will allow us to analyze, which is the effect of the recycled percentage on the rigidity of the testimonies, and how, the use of several kind of bitumen, can counteract this effect. This whole analysis process is carried out for the five actuations of hot recycled carried out in the road C-58, with percentages of recycled, type of bitumen, and thick of milled are different for everyone.

Another task, is the characterization of the structural answer of the firm rehabilitated with a bituminous mixture recycled in hot, by means of the study of the evolution and comparison of the deflexions obtained in situ along all the actuations of the road C-58.

Finally, and once analyzed the test tubes and testimonies of each actuation individually, we will center in the analysis among tracts, comparing the resistances reached by the testimonies and test tubes of each actuation with the other ones, also coordinated with the values of the modules, without losing of view in any moment the composition and the percentage of recycled that it contains each performance.