

ABSTRACT

“Study of the use of bottom ash from incineration plants in hydraulic mortars”

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At the beginning of the nineties an increasing preoccupation with respect to the deposition of the urban remainders (*MSW*) (*Municipal Solid Waste*) was taken in consideration. The used storage medias had become obsolete and insufficient due to the growth and concentration of the population.

With the Incineration of the MSW, the volume of remainders generated by the municipalities is reduced enormously, but it does not eliminate it. The remainders of the incineration are the fly ashes and the bottom ashes. The bottom ashes are defined as the remaining rest of ashes after the combustion.

This thesis studies the use of the bottom ash from incineration of urban solid remainders as hydraulic mortar. This is the first step for the reusability of these sub-products. In order to carry out this ambitious work it has been necessary to characterize the most important aspects of ashes in order to be treated like aggregate.

In this study, the bottoms ashes are coming from two Incineration plants: Mataró and Tarragona.

The main goals of the study and their associated experimental campaign are exposed next:

- Characterization of the properties of the bottom ash in order to relate them to the behaviours that mortars can have.
- Experimental evaluation of the properties that characterize the mortar behaviour with bottom ash. In this sense the behaviour of these mortars in fresh state and hard state has been evaluated.
- Evaluation of the characteristics of mortar based on the origin of the bottom ash.
- Analysis of the variation of the properties of mortars with the increase in percentage of substitution of bottom ashes.
- Analysis of optimal substitution percentage of bottom ashes as aggregates in mortars.
- On the basis of the results, some recommendations for possible uses of the analysed mortars are proposed.

To such goal a bibliographical study is made to know the state of the art of the characterization mortars with bottom ash. In addition the aspects that affect the behaviour of these bottom ashes are analysed carefully.

One complete characterization of bottom ash like barren fine is made by means of the evaluation of the physical and chemical properties with the purpose of defining the best criterion of mortar metering.

An experimental campaign is made. This campaign includes the accomplishment of the necessary tests and obtaining the analysis of the results.

The more important conclusions and recommendations derived from the study are that the bottom ash of 0-3 fractions of both fine incinerator plants have a high content of fine aggregates and a high absorption, which entails that they are not apt for manufacture of high resistance mortar. Mortar with bottom ash from Mataró is more difficult to work with. A very important decrease (around 50%) in the resistance of mortars is observed once a substitution of 25% is made and that the bottom ash of Tarragona diminish to a lesser extent of resistance that those of Mataró for substitutions until 50%. However, the bottom ash of Mataró behave in a very similar way even for substitutions of 100%.

So from this study we can conclude that more than discarding bottom ash from incinerator plants like substitute element of barren in mortars and in concretes, it is one viable possibility.

The bottom ash will have a suitable use in applications that do not need a high resistance and in places where a high humidity does not exist or are in direct bonding with the water.

In any case, one demonstrates that we do not have to discard this material and to continue with this line of investigation.