

Study on mechanical properties of mortar  
blocks using marble dust waste as cement or  
fine aggregate replacement materials



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Academic year: 2017-2018.

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# **1. Introduction**

## **1.1 Abstract**

In the recent years, the use of the binding materials and the substitute materials of different types in addition to cement or to fine aggregate has become very wide in the production of mortars, such as blending of portland cement with marble dust, so it is necessary to investigate the influence of the binder and the substitution material on the mortar properties. In order to assess the performance of this type of mortar, it is important to understand the changes in the mortar properties. The main objective of the research work is to investigate the possibility of utilizing marble dust as a partial replacement of cement or fine aggregate. Several mortar pastes were prepared using marble dust. In order to evaluate the effects of the marble dust on the mechanical behavior, many different mortar mixtures were tested. Mixtures were evaluated based upon cement or sand substitution by the marble powder. The percentage of marble dust that replace the cement or the fine aggregates in this research was 10%, 20% and 30% by volume. Compressive and bending test were performed in order to find the perfect combination of marble dust waste as a replacement material. The main conclusion of the project is that in terms of compressive and tensile strength it can be said with certainty that the optimum proportion when using dry marble dust is S30-D and when using pre-wet marble dust is S10-D.

## **1.2 Introductory information**

### **1.2.1 Sustainable thinking**

In almost all the cases except S20-D the compressive strength is higher than the reference one. It is interesting to see that in case of sand replacement the compressive strength it tends to get better results in case of 10% replacement and 30 % replacement and in 20% the compressive strength is lower than the reference one. When cement is replaced with pre-wet marble dust the compressive strength is higher than the reference but is getting lower the more cement is replace

## 5. Conclusion

1. In terms of compressive and tensile strength it can be said with certainty that the optimum proportion when using dry marble dust is S30-D and when using pre-wet marble dust is S10-D.
2. Compressive strength in case of dry marble dust is higher than the reference one for all the mixes.
3. When using pre-wet marble dust tensile strength tends to get lower with more fine aggregate or cement replaced.
4. In case of cement replacement with dry marble dust the tensile strength is getting higher with more cement is replaced.

## 6. Acknowledgements

This work can be developed by the collaboration with Investment Group IT 781-13.

The investigation was made with the support of Associate Professor Aimar Orbe Mateo.

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