ECO-BRICK MADE BY CONSTRUCTION DEBRIS IN MEXICO

In 2015 the Institute of Engineering of the National Autonomous University of Mexico, through a project led by the researcher María Neftalí Rojas Valencia, created a prototype of ecological brick that represents an innovation in the construction industry due to its manufacturing methods.

The ecological brick is made by debris of excavation (clay), remains of ground and crushed construction, integrated by a natural additive, a mixture of water with Nopal mucilage. In addition, for drying the brick solar energy is used instead of the traditional cooking method for the bricks.

The creation of the new Eco-brick rises from the national legislation which defines minimum environmental standards for ecological buildings and regulates the use of construction and demolitions debris, promoting their use by recycling and prohibiting to discard them in places other than collection centers, recycling points, or authorized places for final disposal.

In the production of the prototype, the composition of an efficient mixture of the materials has been studied, performing the necessary tests to ensure a high quality product. The result is a more resistant brick which absorbs less water than others.

The manufactured Eco-bricks do not need cooking and are exposed outdoors. The drying time is 20 days under environmental conditions.

The result of this innovative production process is an Eco-brick that can be manufactured in standard or particular sizes, in order to be used for interior walls or external buildings. It can replace the conventional bricks in fences, parapets, windows or in construction details of aesthetic purposes.

Eco-brick is an excellent thermal insulator, thus its use in homes and buildings reduces the demand for energy. Its price is 33% cheaper than the conventional red bricks commercialized in the country.

The inventors of the innovative process notice that the industrial production and the use of Eco-bricks could satisfy part of the national demand for this conventional

construction material, estimated in 279.6 million pieces by each State of Mexico. In particular, the Eco-brick has the following advantages of great economic and environmental impact:

- contributes to reduce overexploitation of banks of virgin materials and environmental problems caused;
- allows to recycle waste from the thousands of civil works that are made in Mexico. The need for recycling, in terms of raw material that is generated and not used is 7000 tons/day;
- the on-site use of construction waste minimizes the cost of acquiring and transporting the material;
- solar drying allows to reduce air pollution generated by the cooking of traditional bricks (16.953 producers burn today different fuels that emit greenhouse gases);
- thanks to its thermal insulation characteristics, it allows to reduce the energy costs for heating and cooling the houses.

The manufacturing of the prototypes has required two people to produce ten eco-bricks in one hour, including the preliminary work to select and separate the material and extract the mucilage from *Nopales.* It is estimated that the experience and the production in series will allow to reach the productivity of 25 to 60 units per hour, normally insured by the brick makers. The new production chain could benefit from the collaboration of companies, such as Concretos Reciclados, specialized in recovering the construction waste and returning it already shredded to the brick makers for the production of the new Eco-bricks.

In view that this technology aligned with the new global trends for the development of a bioclimatic architecture will be adopted in the country, the national press specialized in construction and recycling has published articles on the advantages of the innovative process created by the Institute of Engineering in the National Autonomous University of Mexico.

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