CERIS Civil Engineering Research and Innovation for Sustainability

Integration of recycled plastic in sustainable earth architecture

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Summary

The doctoral project pretends to develop a solution for plastic waste, giving it a new life, contributing to reduce the huge amount of waste and, at the same time, taking advantage of its properties to strengthen the performance of earth blocks masonry, and therefore becoming more appealing than constructions with other conventional masonry blocks and bricks.

Being the one to blame for the high negative environmental impact, the construction sector it is responsible for almost 40% of the global energy used and the production of carbon emissions. There is a world hurge to create sustainable solutions for building practices. This being said, earth construction could be a more sustainable alternative, However, there are some limitations regarding their performance.

On the other side, there is the plastic problem that represents a huge environmental impact since it is a non-degradable material. The use of this material is growing year after year and plastic waste represents 70% of the waste found in the oceans.

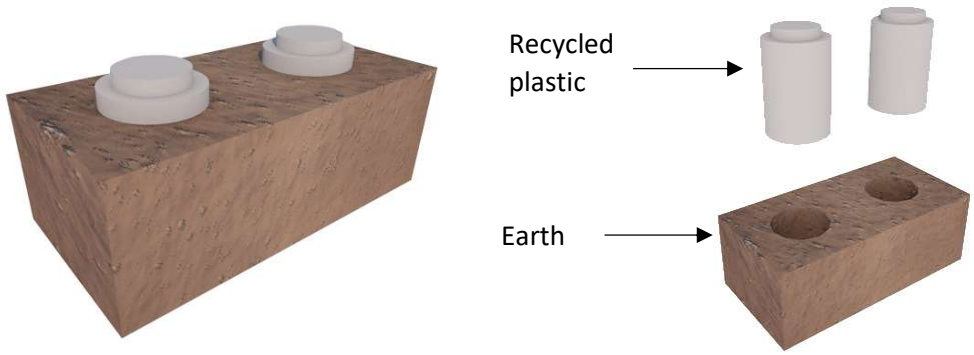
Many studies proposed the use of plastic waste as an aggregate of construction material and it seems to improve some proprieties of those materials. The researchers use plastic mainly in two ways: 1st one shred the plastic into small pieces and the 2nd one melted the plastic, and then mix it with the materials such as soil, cement, etc. Those ways of creating new products are also creating a bigger problem in the future, since plastic waste becomes hard to separate from the other material and, therefore, even harder to recycle.

This doctoral project was designed to solve this problem and pretends to study the all life cycle of the material. The solution thought is to create a single piece of recycled plastic, as shown in Figure.

The project research pretends to test the solution of earth blocks with recycled plastic elements, to assess how it will correspond to the expected parameters for masonry, being able to improve earth blocks masonry mechanical performance, thermal contribution and durability.

Keywords

Plastic waste, earth construction, compressed earth blocks, mechanical strength, thermal properties.



Scheme of the intended solution of compressed earth block with plastic waste elements.