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Honors thesis

COURSE OF ARCHITECTURE FOR THE
SUSTAINABILITY DESIGN

Abstract

**“MAST - Clay Brick with Waste Textile:
ecological building products towards a circular economy”**

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Research and technological development in the building field have made enormous progress in the last decades, in order to organise and to implement new strategies which comply with the fees of sustainable architecture. It is necessary to promote the best solutions to solve the problems of environmental pollution: finding resources, use of energy from non-renewable sources, gas emissions and waste management. In this context, the Thesis proposes a preliminary analysis about opportunities and potentialities may be obtained from development of concept of circular economy in the building-industry field, beginning from an international research, to a local level. What is being proposed is the realisation of a theoretical industrial symbiosis, which is a cooperation between companies, characterised by particular properties to add value to industrial waste and reuse it in another production cycle. The experimentation was developed in a delimited area, in this case the *Pianalto di Poirino* – located between provinces of Turin and Asti – where there are two resources which are developed in industrial field: clay and textile. With the collaboration of the two companies, the *Fornace Carena* of *Cambiano* which produces hollow bricks and the *FIDIVI Tessitura Vergnano* of *Poirino* that produces a technical polyester textile, could be expected to make a clay brick with waste of textile industry. The experimentation was made mainly by hand and it was used a small quantity of materials, however could be obtained a sufficient sampling to draw conclusions. Forty samples has been made – traditional bricks with dimensions of 120x60x30mm – with five different mixtures to understand thier performances with different concentrations of waste textile: 0%, 1,5%, 3%, 4,5% e 6%, related to weight of wet clay. Samples was realized following traditional production cycle of the furnace and after the firing stage – 1050°C -, the waste textile are fully burned, leaving pores which could improve the performances of thermal insulation. Then were performed the crush strenght test and the measurement of the density, from which is possible to have the value of thermal conductivity: these were compared to understand the possibilities of production. In conclusion it could elaborate a new hypothesis to developpe an industrial production chian which uses waste textile in the production of hollow clay brick. This means a careful planning of the all production of the block MAST on industrial scale, taking into considerationt all steps and all addicional machines for the new production.



img. 1 – Waste industrial textile in polyester (2 e 7mm).



img. 2 – Mixture of clay and waste textile in polyester, with concentration of 1,5%.



img. 3 – Sample of experimental brick MAST with dimensions of 120x60x30mm.

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