

POLITECNICO DI TORINO
FIRST SCHOOL OF ARCHITECTURE
Master of Science in Architecture (Construction)
Honors theses

Designing with waste materials

Diary of an experience about reusing carpet

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Waste production in our countries is becoming a serious economic and environmental problem, especially due to the consumerism of our society. Reusing waste materials is one of the most efficient methods in waste management, because it allows the reuse of products while maintaining their properties, embodied energy and raw materials. If we consider the huge environmental impact caused by construction and demolition activities and the amount of raw materials involved, the reuse of by-products and scraps to produce innovative buildings packages could be a clever solution. The reuse of daily life objects has been known for centuries, being often an answer to the scarcity of resources. Similarly in the history of architecture lots of overage buildings had been scrapped and demolished to reuse components or entire parts for others building purposes.

The thesis focuses on reusing scraps and by-products produced in industrial activities. This practice began in the 70s, at the same time of the American ecological movements, where first rose up the experimentations in "garbage architecture": cans, tires, plastic and glass bottles were used professionally as building materials for the first time. Today there are many interesting examples of waste materials reused in construction, but they differ in approach modalities, aims, results and most of all they are hardly reproducible. The most interesting results were achieved in presence of an exhaustive research and a careful experimentation.



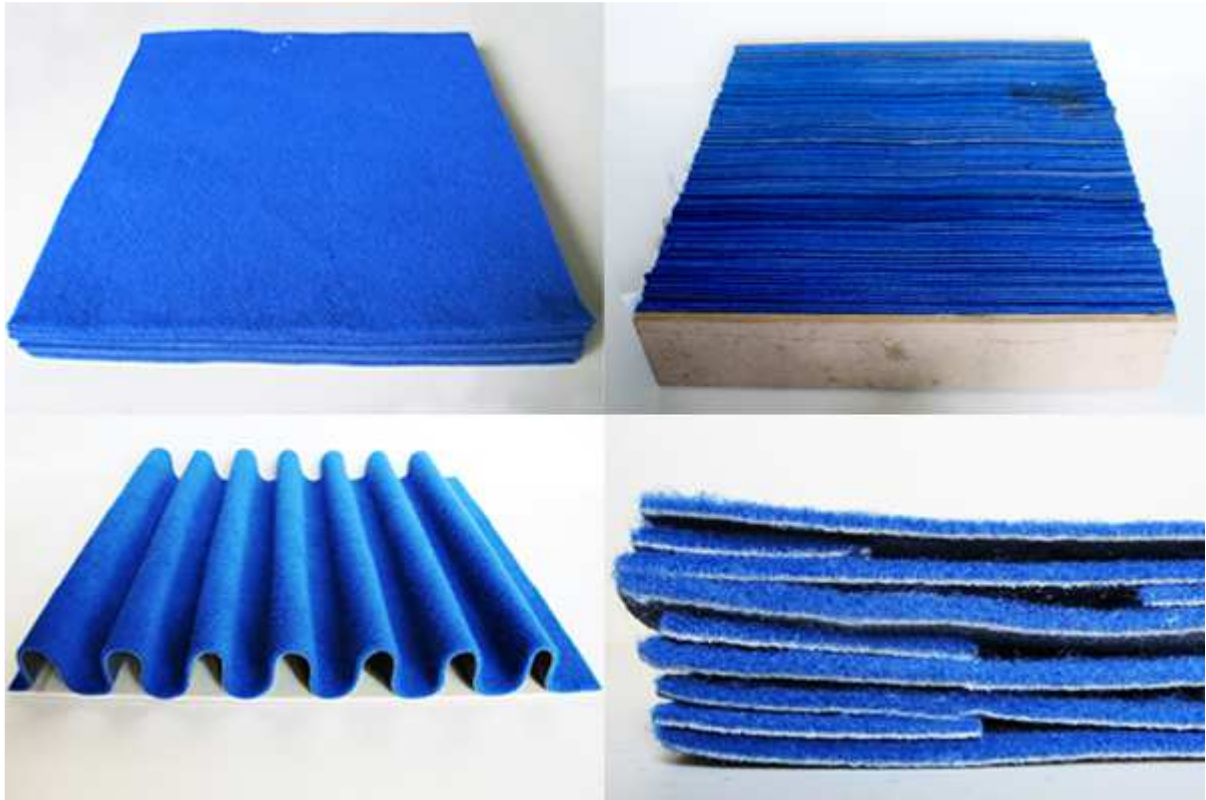
Wikado, 2012Architecten, Rotterdam, 2007

The main goal of the thesis is making this process feasible and repeatable by using a scientific approach. Since it doesn't exist a right and unique method, this work starts looking for built case studies, then proposes a method for the Italian context, following waste management and laws. This allows to select an approach *from object to project*, that begins by spotting available waste materials, then studies the single properties, and finishes by determining hypothetical uses. Furthermore the preferable subjects to supply waste materials are companies that produce scraps and by-products and other subjects that occasionally produce considerable amounts of refuses. The identified products and these information were collected in a summary table, leading to a single choice: a synthetic carpet used in exhibitions and trade fairs. In the thesis were tested carpet tiles coming from the Lingotto Fiere of Turin.



Thrown carpet waiting for the, Lingotto Fiere Turin, 2012

This product is composed by two different plastics with a considerable embodied energy. Every year, just in this exhibition center thousands of square meters of carpet-waste are produced. This entails a huge wastefulness of raw materials and energy because after the short life of the exhibition the carpet are thrown in the landfill. In Italy the recycling process is not practiced because it's still too expensive, hence reusing carpet represents an optimal solution. The product had been tested in laboratories to find out the possible uses as a building material. Thermodynamic, mechanical and ecological proprieties were studied to propose new technologic packages. Three prototypes were designed: a prefab façade for external walls, an insulation panel and an acoustic panel.



The three prototypes: insulation panel, prefab façade, acoustic panel, particular of insulation panel, Turin, 2012

This work is not comparable to a feasibility study of any building material since the tests are only few of the ones requested by the standards. With more means, instruments and professional collaborators the work done could develop in the achievement of an innovative and sustainable building material to launch into the marketplace.

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