



# Three categories of design actions to reuse materials and waste - opportunities for designers at University of Minho

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## ABSTRACT

In this article we present some examples retrieved from Product Design degree at University of Minho (UM) that illustrate a concern with sustainability for the reuse of materials and waste. We propose three categories to design: (Eco) Design-Show: actions, performances and products aimed at sensitizing students and the community, Re-new (Design): mostly handcrafted products for restricted markets, reusing materials or parts of other products; and (New) Design: product design made with new, experimental materials, obtained from wastes. In addition to reflect upon pedagogical inputs of this theme, it is intended to discuss the relevance of designers' skills to promote innovation, complementing other research areas of UM. This paper is a personal reflection on how this may reinforce the potential and opportunistic decision of creating this degree in this industrial northern region, and aims to contribute to the history of young Product Design degree in UM.

**Keywords:** Reuse of materials, Waste, Eco-design, Design pedagogy, Product design.

## INTRODUCTION

This article intends to gather some initiatives and pedagogic works on "waste" and eco design, carried out with students of the degree in Product Design of the University of Minho. This degree opened in University of Minho, in 2012. This paper is therefore a contribution to witness an initial chapter of its history.

For the first time in 2016-17, two undergraduate design students did their curricular 3<sup>rd</sup> year's traineeship at the CVR (Centre for Valorisation of Waste, at University of Minho). This was the motto to organize some topics about the reuse of materials and waste throughout this graduation. Thinking on how to organize and relate those examples with existing cases, we propose three categories of initiatives, products and processes concerning their aims, scalability and their potential as opportunities of future product Designers. We call them:

- 1.(Eco) Design-Show
- 2.Re-new (Design)
- 3.(New) Design

First we will explain and illustrate each one of proposed categories with international examples, and then present examples from briefs of different courses of Product Design Graduation at University of Minho.

## DESCRIPTION AND EXAMPLES OF THE CATEGORIES

### Category 1 - (Eco) Design-Show

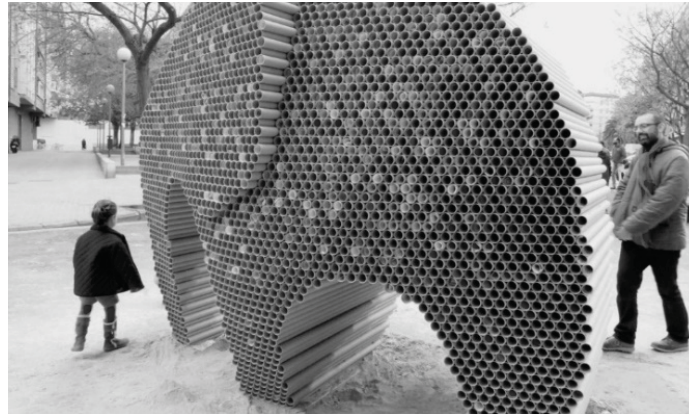
The first category includes activities, performances and initiatives with very diverse audiences. For example, in

various fields of school education, from an early age, interesting works are carried out by reusing common materials, such as plastic, metal or paper packaging, among many other objects. But professional designers also make interesting creations with these materials.

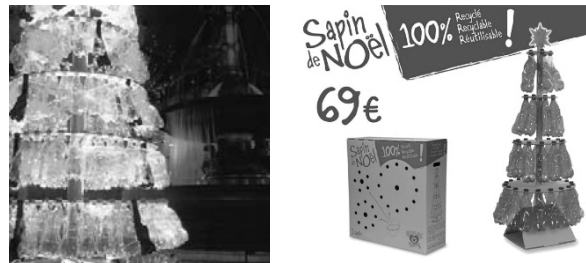
Usually this work results in initiatives for environmental awareness, thus fulfilling the main purpose of the work. These initiatives' purposes end there - they fulfil their aims usually with an exhibition or performance more or less publicized, raising awareness among communities.

One example is a sculpture of Nituniyo, with a shape of an elephant made from over 6,000 recycled paper tubes for Valencia's Fallas Festival (Studio Nituniyo, 2015) (Figure 1- a)

Designpack Gallery (Peltier, n.d.) showed an impressive selection of items made with wastes or reuse of packaging. We selected, among them, two different Christmas trees of Fabrice Peltier made of plastic bottles: one exposed in the street, another to build at home (Figure 1- b). This example goes a bit further, as it is already a product to bring at home, a product that lasts longer than the event.



a) Elephant made from over 6,000 recycled paper tubes, by Nituniyo



b) Christmas trees of Designpack Gallery: one exposed at the street, another to build at home

Figure 1- Examples to illustrate "(Eco) Design-Show" category

## Design for the real world

At the beginning of Design graduation the theme "sustainability" is part of curricular units "Design Theory" and "Project - Concept and Form". In the first case, these matters are related to ethics and social responsibility of the designer. In the other, those contents are framed among practical exercises, concerning awareness for the reuse of materials, adopting a critical look at the physical and social context that surrounds the academy.

A project brief called "Design for the real world" (based on the title of Papanek's book), challenged the 1st years' students to transform newspapers and outdated schoolbooks into useful products. This work was carried out in groups of 4 to 6 students, and took place in the two first weeks of "Project- concept and form". Each group, started by reading newspapers. Then, inspired by real stories from migrants and African communities of former Portuguese colonies, contextualise, justify and give meaning to a design proposal (aiming to reflect upon social role of designers in contemporary world). In practical classes, students produce prototypes, learning some of the properties of paper, and how to produce structures of adequate size that are resilient and that take advantage of the material (for example, its color, images or finishes).

At the same time they discuss the theme of work: the social role of the designer. At the end of the two weeks of work, they are always happy to see that, together and with a definite purpose, they have been able to help solving a problem and create functional and interesting products! This feeling helps to confirm their will-

ingness to study Product Design, and encourages the accomplishment of the following tasks – usually more abstract and demanding.



a) Shoes for migrants



b) School bench



c) Temporary bed

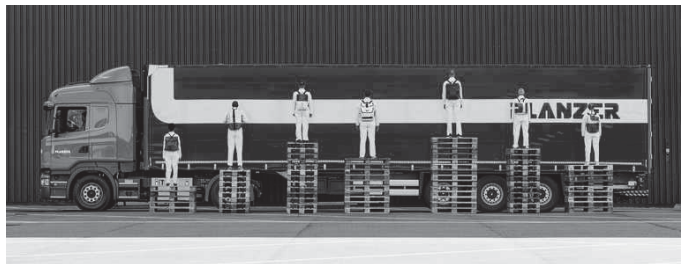
Figure 2 - Students' proposals made with newspapers and outdated books

## Category 2 - Re-New (Design)

The second category considers the creation and development of products for commercial purposes. In spite of that most of those are manufactured with little or no mechanical, chemical transformation, almost directly from materials resulting from wastes, industrial production surpluses or even parts or products at the end of it's (first) life. Typically, this type of products is produced in a small scale. The commercial, and eventually artistic, value increases considering differentiation, unicuity and quality of craftsmanship.

Examples of this category could be Freitag's products (Freitag, 2017) using out of use screens, they propose several models of bags and other products. Each product's design takes advantage of printed colors and graphics, allowing customization. (Figure 3 - a)

The chairs of Remi Tejo made with used clothes, can illustrate another type of products that fit in this category (Tejo, n.d.) (Figure 3 - b).



a) Freitag showing the origin of their backpacks' colours



Chairs of made of used clothes

Figure 3- Examples of Re-New (design) category

## Eco-design course

In the curriculum of the 3rd year of Product Design degree, there is an "Eco-design" course. This envisages giving the students a general overview on product development, considering aspects related with Eco-design. The final goal is promoting awareness of the importance of optimizing use of materials and technological processes for sustainability.

The brief invites students to analyze the life cycle of some objects, and then propose and justify new applications for them.

Students start choosing a product which, at the end of its useful life, may have a new type of use. This selection should be duly justified, on the basis of the benefit expected to be generated in relation to the end-of-life of the original product. In a second phase, a new product or set of products must be developed, which will reuse the original (or part of it). Finally, the initial expectations should be confirmed by making a quantitative analysis of the eco-environmental benefits resulting from the re-use of an original product (or part of it) in a new product.

Here, two products are presented: the first proposes to reuse spoiled umbrellas to make a set of bags (Fig 4 a), and the other, reuses wastes from mousse socks's production, turning it into domestic filters (Fig 4 b).<sup>1</sup>

<sup>1</sup> Authors of examples of figure 4: a) J. Ferreira, J. Oliveira, R. Costa, R. Abreu, S. Fernandes, 2016; b) A.R. Pinto, B. Dourado, B. Guimarães, H. Gonçalves, J. Moreira, 2017.) Professors in charge of "Eco-design" course: Olga Carneiro, Teresa Amorim and Cândida Vilarinho.

These designs are just described and represented in a long report (not prototyped), detailing the way they address the aims of Eco design course, fostering original problem – by analyzing each of the materials and processes used to produce their proposed product, concerning new uses and benefits.

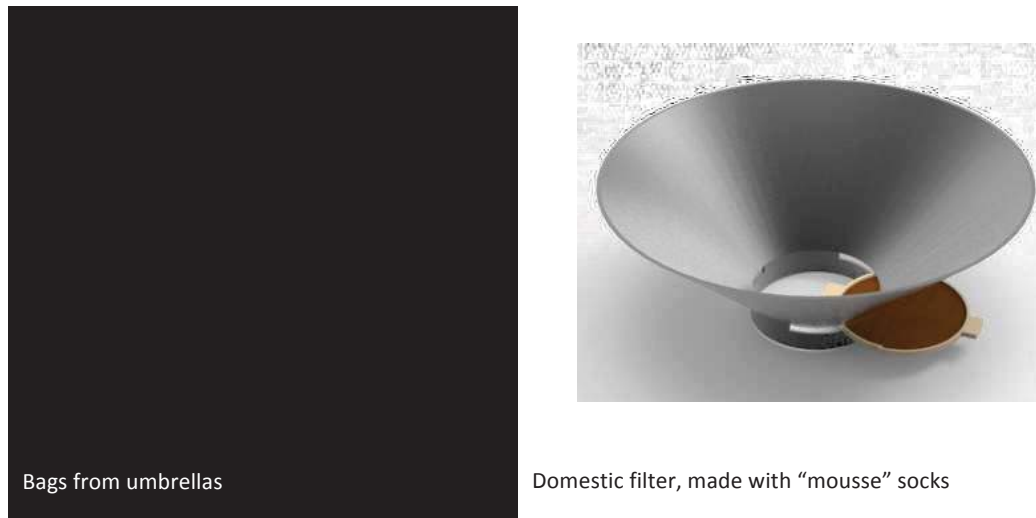


Figure 4 –Design proposals for Eco-design course, in the 3rd year of degree in Design, 2016-17

### Category 3 - (New) Design

The use of wastes for the production of new materials and compounds from industrial and urban waste presents another type of challenge. It is not just a matter of working on the objective appropriateness of the attributes of the material to the requirements of the products - perhaps by replacing the use of other existing, traditional materials. It's also about doing the reverse: look for new fields for application, develop and design products that also explore the symbolic, social and environmental potential of this category of new materials. The success of this combination of attributes in design proposals allows for regular, industrial production for a global market. The examples and principles adopted testify the important contribution of Design to waste recovery and the role it plays for innovation and sustainability in the future.

The first example for illustrating this comes from “Corque design” (Mestre, n.d.): the puff String (Fig 5 - a) “is a playful seat taking to the limit the plastic and visual possibilities of rubber cork”, presented among a series of other innovative e contemporary products, basically made with wastes of Portuguese cork. Other example are Adidas shoes made of ocean plastic (Fig 5 - b). These are part of Parley’s A.I.R. Strategy about reducing plastics in the oceans: “Avoid, Intercept and Redesign”, associated to Adidas for “spinning the problem into a solution” (Adidas and Parley, 2017).



Figure 5 - Examples of category (New) Design

### Curricular internships at CVR

In the end of Product Design graduation the students take a curricular internship - called “Project-Industry”. In 2016-17, for four months, two students did their internship at CVR (center for waste valorization). Both worked with new materials. First, they studied the new materials, in the laboratory. They observed and chose several samples, made of different proportion between components, as treated residues and binders. They studied the adequate production processes, in order to know the constraints to the design of a proposal, and finally, they created very simple drawings, to materialize a proposal of application of the new materials. Some small scaled

prototypes were made, using different processes.

The duration of this work was very short to complete the production and testing of students' projects. However, the realization of prototypes at the end of the stage allowed us to foresee many possibilities of evolution of this type of work, in which designers' skills will play a very important role for the flow and useful application of these materials.

R. Ribeiro worked with mortars made of incineration of industrial wastes, and created a module for urban equipment (Figure 6 - **Two student proposals for applying new materials made from waste**a).

J. Moreira made a small gift vase, with a polymeric material made of Chiclets. (Figure 6 - **Two student proposals for applying new materials made from waste** – b). Both were prototyped using and testing the intended materials.

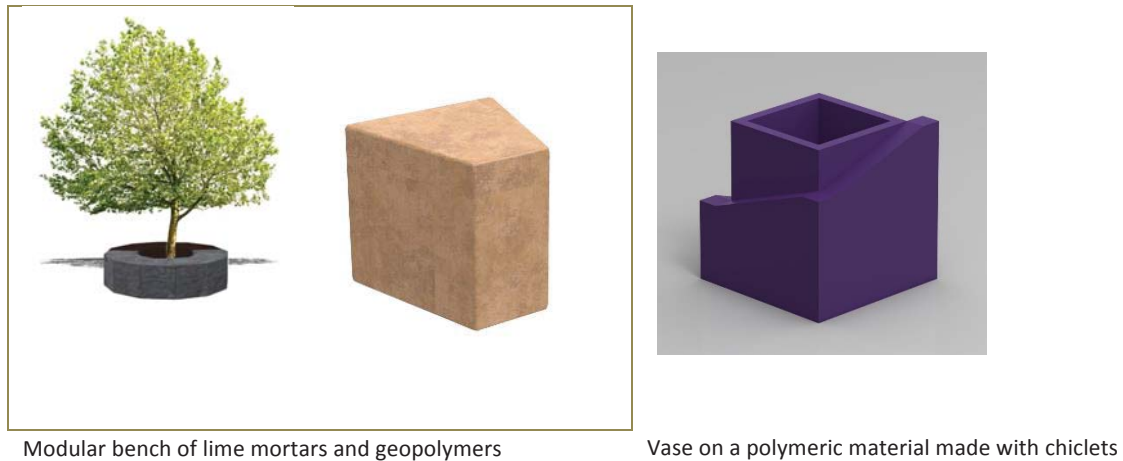


Figure 6 - Two student proposals for applying new materials made from wastes

## SYNTHESIS AND CONCLUSION

We believe that the proposed categories and structure may contribute to organizing the outcomes of design briefs and contents, concerning their pedagogical and innovative aims. In summary those categories are compared and presented in Table 1.

Category	Aims	Scalability	Production	Pedagogic Interest	Added value to product design
(eco) Design Show	Ethics/Sensitize to sustainability issues;	Single use	just prototypes	good	low
Re-new (design)	Ecologic values, Technical knowledge Awareness	Limited	hand-crafted	good	relative (dependent on craft skills)
(New) Design	Taking good Advantage from materials and costumers' requirements. Sustainable innovation Differentiation	Multiple	mass-production/ industrial use	good	high

Table 1- Synthesis of the categories

Gathering the examples presented we may underline three different strategies and initiatives that address waste reuse all over Design graduation at UM, both in a more theoretical and technical perspective, and as a practical design brief; together they aim at raising awareness and showing different references and ethical behavior concerning design and sustainability.

This is a personal reflection, aware of the lack of scientific background on the subject. But the interest aroused by these first experiences strengthens the call for new players generating critical mass in research and innovation in this subject. Sharing the three categories proposed may allow for a fruitful discussion at the conference. The discussion can also contribute to networking, for a positive evolution of programs and results in a near future.

On the other hand, this is still a young graduation with no previous internal design references and research

on the subject. However, there are important resources available for future development of product design on sustainability, related to renowned research in UM, namely in CVR and other engineering labs. We believe it reinforces the opportunistic decision of creating this degree in this industrial, Portuguese region, complementing other research areas of UM.

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