

# Design sustainable products from end-of-life clothes by freshman Engineering students

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**Abstract.** Fast-fashion becomes currently a serious burden for the planet. Beyond being the sector that represents one of the most global production waste sectors, also implies an endless quantity of end-of-life clothes that have been discarded in openair dumpers in African countries. Having this problem as background, first-year Industrial Engineering and Management students were challenged to answer the problem by designing a product recycling, reusing or upcycling the old clothes in a sustainable new product. Therefore, sustainability issues, due to their importance, have to be increasingly present in their daily lives, since they are one of the key players in the global economy. Thus, to produce the product, students also need to design the production system and the process. Although Industrial Engineering and Management engineers are production systems designers by definition, they also have an important role in designing new products as to design a production system they need to have a product to produce. This paper describes how the students, integrated in a Project-Based Learning active learning methodology involving courses like Calculus, Linear Algebra, Programming of Computers, Introduction to Economics Engineering and Industrial Engineering, developed a project with the purpose to upcycle end-of-life clothes in new products having as standpoint sustainability of products, process and production system. Feedback from reports content analysis, oral presentations, products prototypes and answers of a questionnaire was collected. Main results show the learning and awareness of students for this problem and their solutions to that.

**Keywords.** Industrial Engineering and Management Education, end-of-life clothes, production and products design, sustainability.

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