

## Circular fashion and new materialities from repurposing waste: A discussion on the opportunities for the valorisation of material design from and for wearable garments.

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**Keywords:** circular fashion; materials; waste; upcycling; longevity.

### Introduction

Despite an increasing number of regulations, such as the EU EPR (European Commission, 2022; Changing Markets Foundation, 2022), and promising circular material, product and business solutions, the fashion industry remains far from achieving a truly circular model (Circle Economy, 2024). Due to the extraction and processing of raw materials, production, use and end-of-life, this rapidly expanding global industry is one of the most polluting ones, using increasing quantities of fibers, thus exploiting finite resources beyond their regenerative capacities and exceeding planetary boundaries (Alkaya & Demirer, 2014; Hasanbeigi & Price, 2015; Instituto de Recursos Mundiales, 2021; Niinimäki, et al., 2020; Roos, et al., 2017; Shirvanimoghaddam, et al., 2020; Textile Exchange, 2024). The transition towards a circular economy in fashion holds the potential for economic profit by tapping into resources that would otherwise be wasted (Ellen MacArthur Foundation, 2017; Ellen MacArthur Foundation, 2020).

This paper offers a discussion on the benefits of eliminating the concept of waste from the perspective of material design. It considers the valorisation of fashion waste as a meaningful re-imagined secondary raw material resource by and for the industry.

### Opportunities for the valorisation of material design from and for wearable garments

Although various circular solutions have been successfully integrated on a smaller scale, the fashion industry is transitioning towards a

circular economy at a slow pace. Circular design emphasises the intrinsic value of a material, thus facilitating the implementation of multiple extended loops for prolonged use before recycling or regeneration. From a waste management perspective, circular design considers upcycling, recycling and downcycling as economic ways to preserve material value (Aus et al., 2021; de Aguiar Hugo, et al., 2021; Fletcher, 2014; Sandin & Peters, 2018). However, circular design addresses more than the materiality of a fashion product. It seeks to consider the whole life cycle of a garment as well as patterns of consumption and use. This holistic concept, based on systems thinking, encompasses manufacturing, production, use and end-of-life (Fletcher, 2014; Goldsworthy, 2014). Implementing circular principles from the initial design stage is a key approach to reduce the social and environmental impact of the fashion industry (Bridgens, et al., 2018; Goldsworthy, 2014; Jia, et al., 2020; Kazancoglu, et al., 2020; Zavagno, 2023).

There has been a promising increase in the production of new textile materials derived from industrial or agricultural waste, including fibres (Bananatex, 2024; Spinnova, 2023; Circular Systems, 2008), dyes (Archroma, 2025; Ignorance Bliss, 2025; MaterialDistrict, 2018; Recycrom, 2019), leather-like materials (Malai, 2025; Mycoworks, 2025; Briones & Cepeda, 2022; Boltthreads, 2022) and bioplastics (Dezeen, 2023; Designboom, 2022, VT&S, 2022). From a materials perspective, upcycling has the potential to unlock pre- and post-consumer textile waste streams for various industries, entering different design domains (Goldsworthy et al., 2018). In this sense,

upcycling transcends the boundaries of the garment industry, with applications in furniture and interior design (Fab-Brick, 2025; Fabraa, 2024; DenimX, 2025; Denimolite, n.d), art (Hug, 2024; Tiemroth, s.f.), and food (HOLOS Kombucha, 2024; Provin et al., 2021).

As the sources for upcycled materials differ, no definitive statement can be made about their performance, such as durability. Yet, especially in Western societies, the perception of upcycled materials as lower quality may hinder their scalability and industry adoption (Yusuff, 2024). Redesigning goes beyond extending its useful life, on the aesthetic and symbolic level, it consists of an intervention and a process of re-signification, it contains stories and histories, it is a way of remembering, recovering and conserving (Chapman, 2005). It enables inspirational design in which the inherent value of materials is maintained over unlimited future lives, redesigning narratives based on the creation of intrinsic material value (Goldsworthy, 2014; 2017). Upcycling links the new product with its past history through inscribed traces of use, and reflects on the passing of time by embracing signs of aging (Cassar, 2024).

In line with this concept, if the garment contains the material value, then designers become the key to ensuring that value is maintained. In the context of this article, meaningful and intelligent upcycling can be defined as a practice that involves redesign and remaking by valorisation with a focus on emotional durability and longevity. In this sense, creativity of the designer becomes a tool that leads to meaningful, inventive, novel and valuable product outcomes, not the mere purpose or result in itself. Reclaimed materials re-imagine secondary raw materials into new products, modifying their residual meaning with a meaning of value and quality (Chiais, 2022). The performative value derived from the aesthetic and symbolic dimension becomes a significant and complementary aspect to consider within circular fashion design.

This multi-perspective approach to design, encompassing the material, the garment, and their narratives, demonstrates the intricate and multifaceted nature of the fashion system. The implementation of holistic circular design principles represents a pivotal strategy for the fashion industry. The valorisation of waste presents a valuable opportunity for a beneficial

socio-environmental impact, where material quality is an integral aspect of the aesthetic appeal.

## Conclusions

While the circular solutions discussed above may be perceived as novel, it can be concluded that the imperative to eliminate the concept of waste from production systems can be paramount. It is more beneficial to integrate the principles of designing for circular systems and/or the concept of cradle-to-cradle design into the initial stages of the product life cycle as presented in this discussion. From a fashion perspective, it is essential to evaluate the functionality and the relationship with clothing, as well as the performative, aesthetic and symbolic aspects associated with its intended use. This perspective encourages the discourse surrounding the integration of sustainable strategies and symbolic perception in the design from fashion waste, emphasising the potential of new materials in challenging the longevity of both materials and designed garments. The contrast between new materials derived from secondary -or waste- sources and the performance sought after in fashion arises when considering product longevity and material longevity. By understanding these contrasts, designers may resolve the conflict between the application and performance of new materials designed from waste.

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