

Community Paper

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Research
Directions



The challenges faced by (bio-)designers in contributing to sustainable material development

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Extended Abstract (300-500 words)

Designers working in analog design disciplines often generate ideas through physical means. Prototyping plays a pivotal role in the development of new materials for a circular industry, serving as a crucial bridge between innovation and sustainable production by enabling experimentation, refinement, and validation of novel material concepts. The process of prototyping also reveals problems and opportunities at a systemic level, leading to deep interconnected sustainable thinking, provided that the material life cycle is consistently considered.

Designers, particularly in the fields of material, product, and textile design, are in a position to mediate between the material and system approaches, the hands-on material design practice, and industrial production. Therefore, this abstract suggests the urgent need to involve designers in the early stage development of novel materials and strategies.

The premises for this abstract arise in response to the challenges faced by the Conscious Textile Group at Moholy-Nagy University of Art and Design in Budapest during a collaborative research project with the Hungarian fashion brand Nanushka. The project aimed to develop circular textile materials based on down-to-fiber recycling from pre-consumer textile waste. Throughout the project, we identified a mismatch between the project's goals and the possibilities of execution due to the lack of recycling infrastructure that would allow for rapid prototyping and material experimentation.

The product and textile sectors encounter hurdles in materialising proof-of-concept stages for next-gen materials, primarily due to the industry's lack of agility, which continues to function as a closed system and leaves little room for cooperation. To nurture a generation of designers with inherited sustainable thinking, a paradigm shift towards a decentralised system is urgently needed.

An expansion of the current monopolised infrastructure is imperative, necessitating the establishment of local prototyping labs equipped with small-scale, medium-tech machinery catering to diverse material disassembly and reconstruction techniques. This facilitates the development of affordable, proof-of-concept prototypes using machinery mirroring real-world industrial processing scenarios, thereby enabling a seamless transition to large-scale production post-prototyping.

Designers are guiding the way towards this approach. Case studies showcase the benefits of democratisation, enabling more agility and faster responses to the climate emergency. Young designers turning into developers of open-innovation tools to help support the approach of democratising next-gen material development. As an

example, the Berlin-based design studio Hilo developed an open-source digital spinning machine that allows designers to control the entire prototype manufacturing process. Simultaneously, initiatives like Precious Plastic have developed a series of machines to repurpose plastic waste into new products, collectively recycling over 370,000 kg of plastic to date

However, such democratised systems remain niche. Upscaling these initiatives, inclusive of young designers and change-makers, and expanding across various design and material development domains, offers the potential to turn the current rigid system into a more resilient one, less susceptible to negative disruption, and a step towards a more sustainable production industry.



(a)



(b)

Figure 1. Rethinking textile recycling processes (a) Testing a hollander beater as a potential small-scale fibre recycling machine (b) Conventional recycling machines require several Tonnes of material. (Image credits: (a) Milan Racmolnar (b) Malu Luecking).

Connections references

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