

Textile Design for Disassembly:

Temporary material systems for borrowed resources

Laetitia Forst

Laetitia is completing her PhD at CCD this Autumn. She is a multi-technique textile designer whose practice explores the tension between technical challenges and creativity in sustainable design for textiles. Her doctoral research explored the potential of Textile Design for Disassembly to increase recyclability in material combinations. She is currently a post-doctoral research fellow at UAL.

Combining resources with diverging recycling routes has been widely recognised as impeding the transition to a circular textiles economy (Östlund *et al.*, 2015; Ellen MacArthur Foundation, 2017). This short essay considers one out of a palette of strategies that can be explored to circumvent current recyclability barriers: Textile Design for Disassembly.

MAKING MONSTERS

How blindly we as designers have been taking and blending resources for our own aesthetically or technically driven purposes, with no thought for the future. In assembling materials from different cycles and creating these Monstrous Hybrids that can no longer be recovered and regenerated, we have put on our Frankenstein lab coats to create blends with little consideration for their afterlife and the damages they may be causing there.

To avoid resource depletion and waste, the circular economy brief suggests that materials should be transformed and used with their end of life recovery and regeneration in mind from the very beginning of the process. This foresight also means that materials with differing recycling routes should be kept separate to avoid difficulties down the line.

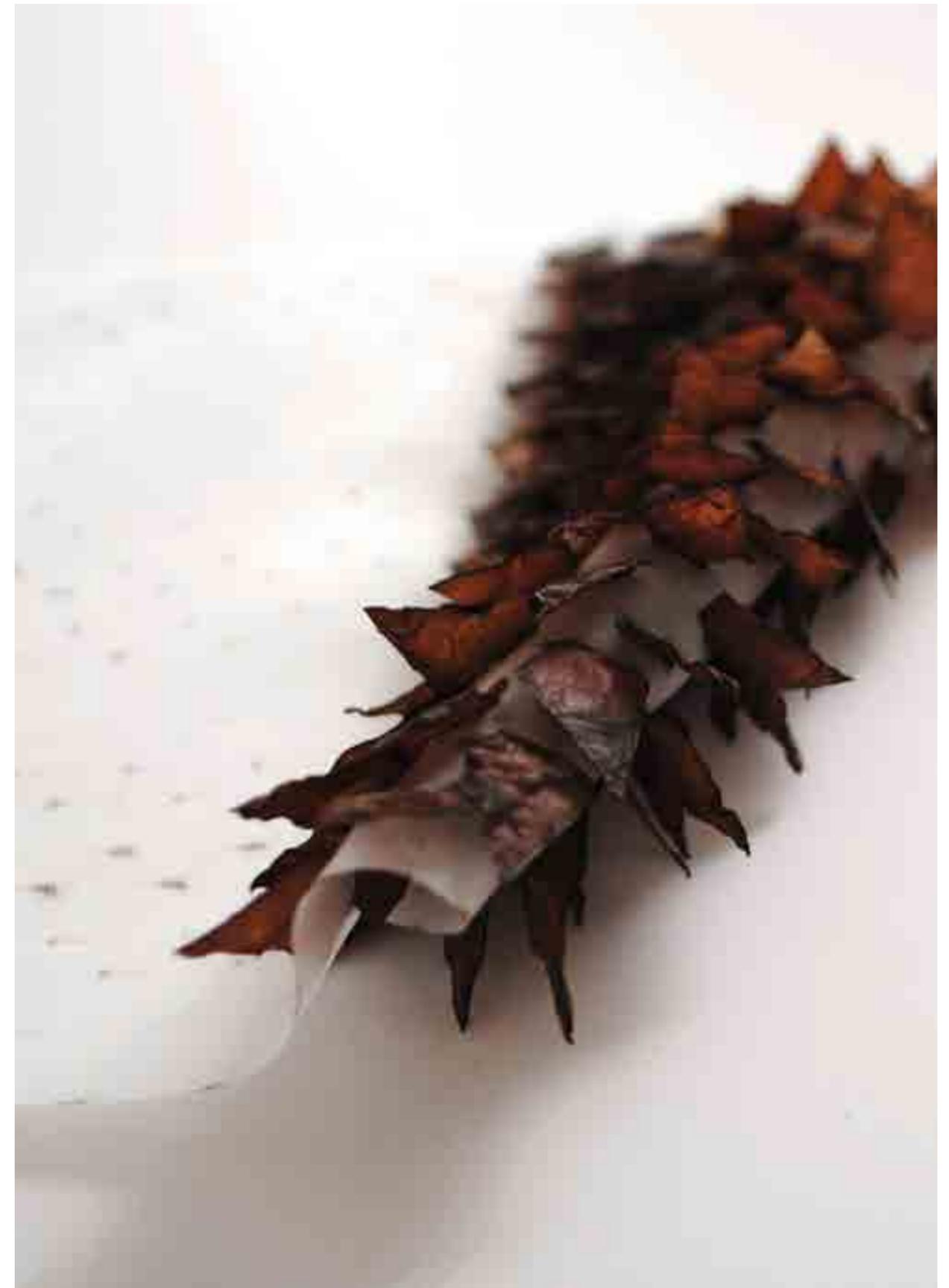
However, the ability to combine materials with complementary or contrasting textures, colours or other properties is essential to the work of textile designers.

The joy of pushing the boundaries of a raw material's properties through stitching, weaving, knotting, laminating, and finishing fabrics is what makes textile design so creatively rewarding. The beauty of a coarse wool thread winding, coiling, curling around a lustrous smooth nylon and creating a complex combination that tells a story of opposing forces is itself intertwined with the pleasure of making textiles. But how can this be done without creating permanent barriers to material regeneration?

DESIGNING FOR DISASSEMBLY

Designing textiles for disassembly means that individual components that would normally be challenging to recycle together can be combined and then taken apart so that the highest value can be recovered from their recycling. These Beautiful Hybrids could be a temporary and considerate alternative to permanent blends.

The strategy can be added to the range of available options when designing for recyclability and can be an alternative to mono-material design when a mix of resources with different properties and recycling parameters is needed.



Bio-cellulose 'sequins' are attached to a polyester fabric base using Textile design for Disassembly techniques and showing the potential for temporary combinations between resources with different lifespans and recycling routes. Photograph by the author.

Other designers and problem solvers have come across this challenge of needing to combine different components and still be able to separate them, and there is a lot to learn from those involved in the use of toxic or rare materials (Vezzoli and Manzini, 2008; Ziout, 2014). Consider how for example they have been facilitating the extraction of gold from waste electronic products by making all the screws in the implement fall out when subjected to a high temperature. Now where are the screws in our textile combinations? Can we adapt the assembly techniques combining different materials so that they can be easily released when necessary?

It seems as though the time is ripe for designers to use textile resources with the same care for future regeneration as when dealing with rare minerals. Textile design for disassembly is a method that combines a variety of techniques for detachable connections which enable the recovery of the components in a fabric combination.

The approach puts textile design and creativity at the centre of the solution to blends. If we are to rethink material combinations, then it should be from the perspective of the designers which are currently creating the barriers to recycling. It gives a structure for the responsible use of materials as part of temporary assemblies which enable the end of life recovery of the components. This strategy isn't material-specific, the resources used in these combination "recipes" can be interchanged depending on the brief or the desired outcome.

CIRCULAR SYSTEMS

If we are to take these techniques into the making of new types of material combinations, then what can this mean for the products that emerge from them? The techniques are meant to act as metaphorical hinges, enabling the assembly and disassembly of a variety of different materials and including these temporary combinations in open and regenerative systems. They suggest ways in which alternative resources which are challenging to use as mono materials could be supported by more conventional textiles. For example,



Textile design for Disassembly techniques: fabric elements are combined using laser cutting and hand assembly to replicate effects of embroidery that can then be taken apart by hand. Photograph by the author.

bio-based materials which present exciting aesthetic qualities but low resistance to friction and tear could be temporarily attached to a durable synthetic base and still fully compostable when the elements are separated. These types of extreme material assemblies offer a future probing outlook on the effective use of ephemeral and low impact materials for fleeting trends.

Another provocative aspect of textile design for disassembly is the way it moves away from the traditional techniques which currently prevent separation, and towards systems which can enable reversible assembly and disassembly without any specific textile skills.

The ease with which the components come apart for recovery opens up the process to the users and suggests new ways to interact with materials during the use phase.

This can be harnessed towards scripting new sustainable behaviours in which the structural qualities of materials enable transformations that can renew interest in the product and extend its lifespan before the full recovery for recycling of the components (Forst, 2018; Earley and Forst, 2019).

Design for sustainability and circular economies tends to give attention to the inherent environmental qualities of the materials, focusing on the reduction of pollution and responsible practices in the extraction and transformation process. While this is essential to moving away from harmful habits, using circular materials in linear assembly systems still defeats the overarching purpose.

A holistic perspective on circular design requires that we include the unmaking of the products into our design briefs so that the best possible outcome for material recovery can be achieved for every single raw material involved.

Beyond this, the systems in which these materials themselves evolve can be challenged. New material combinations can design ahead and anticipate changes in material flows. They materialise a vision for a future in which resources are borrowed, thoughtfully connected and then returned in a regenerative system. Textile design for disassembly acknowledges the transience of product journeys: what a relief to forgo the responsibility of permanent material blending and devaluation, and never again make anything that cannot be unmade.

Notes

<https://www.lforst.com/>.

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