Diverting Textile Waste from Landfill with Crafted Objects

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Abstract

This paper appraises how materials from industrial waste streams have been appropriated for design-craft processes – in this case, synthetic textile waste compression moulded into hard shell clutch bags.
Cross-referencing research-led practice with key texts (Klein 2008, 2010, 2014; Braungart and McDonough 2002; Bruno 2010) and the creative practice of others (Freitag, Salty Bags, Vlieger & Vandam), we will discuss the making processes and outcomes in the context of waste and sustainability

Responding to the financial crash of 2007, many have observed that we own too many things. Clothing is among the worst examples of our wastefulness, where in many high street shops t-shirts - made in appalling working conditions far away - are so cheap they are virtually disposable. Many consumers give little thought to the energy and natural resources required and human cost involved, while cheap, poor quality clothing quickly becomes waste.

Arguably, charity shops provide an effective way of recycling clothing. But nearly all clothes wear out, so this, as Braungart and McDonough would say, is really down-cycling - merely stopping off on its way to landfill. (2002: 4)

A case study from an MA design student major project illustrates issues of provenance around textiles production and waste and responds with making to affect a small, but meaningful difference to reducing waste.

There are numerous ways in which synthetic textiles can be recycled, including shredding, powdering and breaking down with cellulose, but all requiring industrial hardware and/or chemical processes.

The project aimed to find a simpler way to divert textile waste from landfill. Every year, 350,000 tons of clothes, approximately 1/3 of all the clothes sold in the UK, ends up in landfill (WRAP 2012: 2 and 12). Polyester is the second most dominant textile in garment manufacturing, after cotton. Throwing away worn out synthetic clothes is no different than throwing away plastic bottles without recycling them.

Synthetic fibres (polyester, nylon, polyamide etc.) are easily reshaped with heat, which fuses layers into a hardened textile boards without any additives or adhesives. At an early stage in the project, wardrobes (storage for clothes made from clothes) were considered, but the clutch bag was chosen for initial experiments due to it being a small-scale object. With greater resources it would be possible to build large suitcases and even chests of drawers which would have a more substantial and farther reaching impact on reducing waste.

Using an aluminium compression mould the fabric has been pressed into a new shape forming the shell of the clutch bag (see figs. 2 - 9). The making process fuses craft processes (sewing) with processes borrowed from heavier industry (compression moulding). Iterative experiments have been made, and the craft-design progress is on-going.

The development of these products has provided new insights on making and methods for exploiting waste streams, but also a critique on how we buy and own clothing.

Introduction

The latest glance at the Primark website shows men's white t-shirts retailing at the astonishingly low price of £2.50[i] . To make these products, the cotton has to be grown, harvested, sorted, cleaned, transported, spun, cleaned, woven, bleached and transported again. Then cut, sewn, packaged, shipped, distributed, sold, placed in a bag, taken home, worn, washed, tumble-dried, and, hopefully, worn again, although not always, then discarded, sometimes with the rest of the household waste, then to landfill (WRAP 2012), although maybe stopping off as a rag, on the way.

Some may think that that is not so bad: the t-shirt is cotton, a natural material that grows on a plant, therefore = good. But the impact of that chain of production continues: that cotton crop requires large amounts of fresh water and energy to produce; it is likely to be displacing edible crops, which may otherwise allow cotton producing countries to grow more of their own food rather than importing it, and exporting cotton to make a cheap t-shirt that may well be worn only once.

Part of the issue here is our disconnectedness with the making process. A greater understanding of making may help us to reflect not only why our clothes are so cheap, but how we once made them. Fashion designer Amy Twigger-Holroyd summed this up in a plenary at the 2015 Research Through Design conference when talking about her work with knitwear. A participant in one of her studies on making remarked that "…knitting is really difficult, so why are jumpers so cheap to buy in the shops?" (Twigger-Holroyd 2015).

This highlights the other key issue: the human cost. A quick glance at the care labels in our wardrobes shows that they are often made far away – such as Vietnam, India, Sri Lanka, The Philippines, and China – by workforces on very low pay. Conditions in the textiles industry were brought to prominence with the structural collapse of the Rana Plaza factory building in 2013 Bangladesh killing over 1,000 workers. These people were working for very low pay in unsafe conditions so that western consumers can enjoy fashion garments at such low cost as to be nearly disposable – this is not news and is widespread across manufacturing in many developing countries. Spanish artist Yolanda Dominguez responded to this with a series of performance artworks entitled Fashion Victim (2013) where performers lay covered in rubble on a busy shopping street as a reminder to shoppers of the cost of their cheap clothing.[ii]

Last year it was widely reported that messages had been found on a Primark clothing label, supposedly written by a factory worker. One had the words 'Degrading sweatshop condidtions', another said, 'Forced to work exhausting hours' (Rustin, 2014). Although probably a hoax this has further highlighted an old problem. In 2007, an undergraduate design student[iii] created a project that worked in a similar way. Debra Thompson programmed a bar code which was secretly stuck over those on the price labels in high street shops. The idea was that the bar code scanner would read this and instead of the price appearing on the till, the words 'Slave Labour' would appear instead (see fig. 1), this was before the 2013 Rana Plaza factory collapse highlighted further the terrible working conditions endured by many to provide us in the west with low cost clothing.

Fig. 1. Debra Thompson's guerilla barcode, 2007 (D. Thompson/Edinburgh Napier University, 2007)

It could be argued that the problem of fast fashion is still hiding in plain view on the high street, but Naomi Klein (2008, 2010, 2014) has been writing about this for many years, and Braungart and McDonough (2002) in Cradle to Cradle underpinned circular economic thinking which is now gaining momentum. The fashion industry's impact on climate change is increasingly recognized, yet, the global economic model is still based on growth (Latouche, 2009).

A transition from this is difficult. The 1951 film, The Man in the White Suit, where the protagonist discovers a fibre that is indestructible and instantly cleans itself, thus rendering all future production unnecessary, has been referred to in several documentaries[iv] , to illustrate a strong fear of product longevity in modern capitalism. However, it is by no means impossible to say 'farewell to growth' (Latouche 2009 Jackson, 2009), and there is no excuse to countenance profit through disposable or fast fashion.

The Problem

We need clothing: it protects our dignity and defends us from the elements and for many defines the occasion and sends powerful messages on status, but why do we need so much? The 2012 Waste and Resource Action Programme (WRAP) report Valuing Our Clothes, states 'Around 30 per cent of clothes in the household wardrobe typically have been unused for at least a year' (WRAP 2012: 4). There are many declarations and treatises on owning and using less (Bruno 2012; Buy Nothing Day), and repair, but these debates rage at political, economic and global levels. At a logistical level, where retail fashion designers can make interventions, there are other challenges. Designers can of course choose materials and processes of sound provenance but this increases the cost. Persuading retailers to sell and people to spend more on fewer, higher quality, longer lasting garments in an industry where collections change literally by the season, is difficult enough. Those on a low income may struggle to prioritise their finances for buying expensive clothing, even if it is understood it will last a lot longer. Designers can also choose to design in the context of a circular economy with disassembly and reclamation of materials in mind. Again, this is a challenge with so many fabrics being made of a cotton-polyester mix, which limits the potential for disassembly. Almost half of clothes use synthetic man-made fibres, polyester being the most common. While there are a few material recovery schemes - recovering the fibres through shredding to be spun into new yarn; or depolymerisation of synthetic textiles for fuel - in the UK alone approximately 350,000 tons of textile waste each year goes to landfill (WRAP 2012: 2). Much of this is clothing, a lot of which is still wearable but simply unwanted.

Some fashion companies have been experimenting with using materials from other reclaimed sources. Global clothing brand G-star collaborated with Parley for the Ocean to create a collection of clothing, Raw From the Ocean. The textiles are made from yarn spun from waste plastic retrieved from the ocean, mixed with cotton to make a 'bionic yarn.' Adidas, also in partnership with Parley for the Oceans developed training shoes from fishing nets. These projects ostensibly address a different issue – plastic pollution in the world's oceans – but are a step in the right direction. The products are all commercially available, but there is some scepticism about the mixing of polymers with cotton, as ultimately these garments will wear out and with mixed fibres are more difficult to recycle.

Polyester is the second most dominant textile in garment manufacturing, after cotton. There is some debate on which is better or worse? Cotton is a natural material but demands enormous amounts of fresh water and oil in its production; polyester is derived from oil. Throwing away worn out clothing made of 100 per cent synthetic fibres is essentially no different than throwing away plastic bottles without recycling them. Both can be shredded a reformed for a new use in another product. However, numerous online sources show that scientists believe we are at or soon to be approaching peak oil consumption . Allwood and Cullen tell us that in the last 50 years, the world's population has doubled and 'our use of engineered materials has increased by four to fifteen times' (2012: 7).

The Project

It was understood that for a post-graduate student major project spanning only fifteen weeks the work needs to be framed within a viable boundary. The MA Product Design Prototyping explores making as a research and ideation process in design and it was decided to use the waste material in a making process where product design and craft converge. Much of the work took place in the university's polymer laboratory, not commonly used for craft-based production. A small-scale artefact – a clutch handbag – was chosen as a feasibility study for more ambitious projects at a later stage.

There are several precedents for successfully diverting textile waste into a new economically viable product. Swiss company Freitag started making bags from haulage lorry awning in 1993. The edges of the material were trimmed with rubber from tyre inner tubes and the straps were from seat belts. Their product portfolio has expanded to include wallets, computer cases, and even footballs and the business exploits a plentiful industrial waste stream. The Corfu based company Salty Bag uses boat sails in a similar way. In both cases, these companies use a robust and durable material, but using clothing like this is more difficult without first re-processing the material. Vlieger & Vandam provided further inspiration for the process with their range of bags with embossed forms and patterns on the side some of which will have involved the use of moulds.

Starting with 100 per cent synthetic fibres, garments where re-evaluated and viewed for what they are – a mass of plastic. The plastic fibres cab be melted back into more solid forms – this in a way is the reverse shredding PET bottles for making fleece sweaters.

Discarded garments and other textiles were layered up in a male-female aluminum mould and forced together under heat and pressure (figs. 2 and 3). Early experiments tested different textile materials and blends varying the layers, the time and the temperature, as well as evaluating the performance of the aluminium compression mould. Experiments were also conducted with pure polyester, polyester/cotton blends, polyester/wool blends, and acrylic, all of which reacted differently, but proved the principle of the idea.

Fig. 2. Layering of materials in an aluminium compression mould.

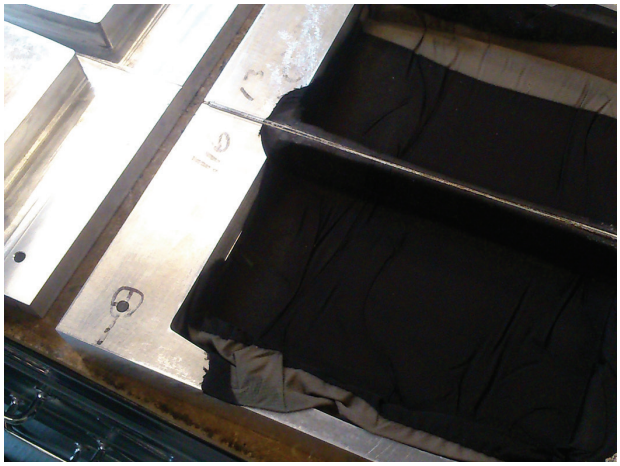

Fig.3. Re-opening the mould

This created a range of rigid forms which could be used as the two sides of a clasp handbag (fig. 4 and 5). In one case a mould was attempted from a polypropylene carpet tile (fig. 5). This melted too quickly and stuck to the aluminium. It took two hours to clean it off, but the tactility and structure of the result was interesting.

Fig. 4. Polyester clothing moulded into a two sided rigid shell for a clasp bag.

Fig.5. Attempt to mould a polypropylene carpet tile

Embossed logos derived from the symbols on care lables and cut from sheet aluminium (figs. 6 and 7) and were interchangeable within the moulds.

Fig. 6. Logo derived from symbols from care lables, cut and embossed onto the bag (see also fig. 4).

Fig.7. Another logo embossed onto the bag.

Among the most delightful were the experiments with acrylic knitwear, particularly a black loose-knit scarf which turned orange (figs 9 and 10).

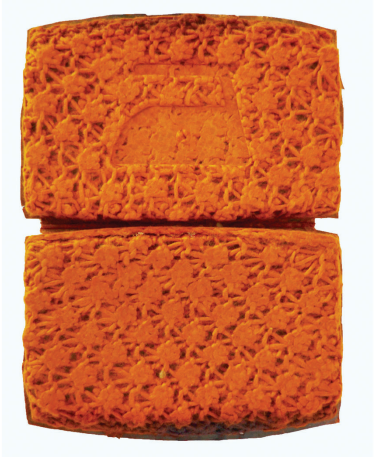

Fig. 8. Rigid shell moulded from loose-knit acrylic scarf.

Fig. 9. Rigid shell moulded from loose-knit acrylic scarf, folded.

Conclusion

These artifacts were made using industrial materials, and industrial tools, but the process is essentially craft. It revealed a viability, all-be-it on a small scale, for a process taking a vexing waste stream in the production of craft-based luxury goods, which could be expanded to larger artifacts, thus with an increased impact. However, the project does not pretend to have a substantial and far reaching impact on reducing waste. We know that the ultimate answer is to use less: Victor Papanek wrote in The Green Imperative in 1995 of the need for us to share more and buy less (1995:183-202), stating, 'the easiest way to save resources and energy and to cut down on waste is to use less. This statement is so simple as to sound banal.' (Papanek1995:183). Julian Allwood, interviewed on Radio 4's Costing the Earth in 2013, summarises this is the context of a more technological enquiry:

'we've spent 30 years looking for magical technological fixes to make materials in new miracle ways, that don't use energy or lead to emissions. The reality is there aren't very many. If you care about a big change in our emissions, the answer is we need to use less.' (Allwood 2013)

But in terms of making, the bags attracted much positive feedback at both the university's degree show and New Designers 2015. The project yields discovery and debate through making and has stimulated further enquiry. In principle, if the fibres are 100 per cent synthetic, they can be re-used within a circular economy in a number of ways. The method is undergoing further exploration and testing with the scope of reducing the relative cost further and identifying the optimal polyester blend for producing a wider range of products. With greater resources and larger scale equipment, a greater impact may be achieved through larger and more useful products such as suitcases or even wardrobes – products for clothes from clothes.

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Acknowledgements

We would like to thank Colin Malcolm, Blair Reid and Bill Young of Edinburgh Napier University their assistance in making prototypes, along with colleagues in the university's polymer laboratory.

i http://www.primark.com/en/homepage accessed 1 Feb 2016

ii http://www.yolandadominguez.com/en/project/fashion-victims-2013-2/ accessed 1 Feb 2016

iii Debra Thompson, design graduate, 2007, Edinburgh Napier University

iv The Lightbulb Conspiracy (2010), directed by Cosima Dannoritzer [Film]; The Men Who Made us Spend, BBC 2014

v See, among many others, Energy Policy Vol. 38, Issue 8 (2010) at http://www.sciencedirect.comscience/article/pii/S0301421510001072; National Geographic (2011) at http://voices.nationalgeographic.com/2011/05/05/the-world-has-passed-peak-oil-says-top-economist/;