

Design for Cyclability. Recycling-Oriented Product Development Using the Example of the Practical Implementation of a Menswear Rain Jacket

Jana Lewin

Hochschule Niederrhein – University of Applied Sciences, Germany

Abstract

Purpose: This work aims to develop a recyclable menswear rain jacket made of polyester. A smaller variety of materials crucially enhances the recyclability of the product, especially in the case of plastics processes, which is why it should preferably only consist of one material. Besides this guiding principle, the functionality of the jacket should not be impaired.

Methodology: The strategy used here is described as Design for Cyclability. After the theoretical elaboration of the topic and the definition of the exact criteria, the next step is to develop a prototype. This practical implementation is mandatory to determine the degree of contamination by polyurethane and thus the recyclability. During product development, all the necessary information is generated, such as the weight of the jacket or the consumption of the outer fabric, to calculate this contamination.

Findings: The actual proportion of polyurethane in the materials is not disclosed by the manufacturer, thus a statement about the product's purity can only be made hypothetically. For example, with 5% polyurethane in the outer fabric and 70% polyurethane in the seam tape, the final product would only consist of 6.3% polyurethane. Additionally, the selection of material and design elements guarantee functionality.

Originality: This study clearly shows design in terms of mono-materiality contributes significantly to recyclability and thus, the conservation of resources. Moreover, this strategy leads to new design solutions since the idea of recycling is already integrated at the product creation stage.

Keywords: recycling, design, menswear, mono-materiality, ultrasonic welding, polyester, laminate.

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Corresponding author's email:

jana.lewin@stud.hn.de

References

- [I] Textiles Environment Design (n.d.), "TED's Ten: 2 – Design for Cyclability", available at: <http://www.tedresearch.net/2-design-recycling-upcycling/> (accessed 16 May 2021)
- [II] Resyntex (n.d.), "Chemical Recycling. Making Fiber-to-Fiber-Recycling a Reality for Polyester Textiles", available at: <https://greenblue.org/work/chemical-recycling/> (accessed 16 May 2021)
- [III] Sympatex Technologies GmbH (n.d.), „Produkt und Technologie. Die Sympatex Membran“, available at: <https://www.sympatex.com/ueber-uns/produkt-und-technologie/> (accessed 16 May 2021)
- [IV] Nucleus: Nucleus GmbH (n.d.), "US-Grundlagen – Ultrasonic Welding", available at: <https://www.nucleusultrasonics.com/support/grundlagen/> (accessed 16 May 2021)
- Bvse (2020), "Textile Study 2020: Demand, Consumption, Reuse and Recycling of Clothing and Textiles in Germany", available at: <https://www.bvse.de/gut-informiert-textil-recycling/studie-2020.html> , (accessed 16 May 2021)
- Durham, E. (2015), "Technical Design for Recycling of Clothing", in: Blackburn, R. (Ed.): "Sustainable Apparel. Production, Processing and Recycling", pp.187-198
- Ellen Mac Arthur Foundation (2017), "A New Textiles Economy. Redesigning Fashion's Future", available at: <https://www.ellenmacarthurfoundation.org/publications/a-new-textiles-economy-redesigning-fashion-future> , (accessed 16. May 2021)
- Fontaine, A. (2014), „Technologie für Bekleidungsberufe. Grundstufe und Fachstufen“, Bildungsverlag EINS, Cologne
- Gulich, B. (2006), "Designing textile Products that are easy to recycle", in: Wang, Y. (Ed.): "Recycling in textiles", pp.25-36
- Lechleithner, A. et al. (2019), "Chemical recycling of mixed waste plastics as complementary process pathway to increase recycling rates", Österreichische Wasser- und Abfallwirtschaft, 06 November 2019, pp. 47-60, available at: <https://link.springer.com/article/10.1007/s00506-019-00628-w> (accessed 16 May 2021)
- Markova, I. (2019), "Textile Fiber Microscopy. A practical Approach", Wiley
- Martens, H. and Goldmann, D. (2016), „Recyclingtechnik. Fachbuch für Lehre und Praxis“, Wiesbaden

Niinimäki, K. and Karell, E. (2020), "Closing the Loop: Intentional Fashion Design defined by Recycling Technologies", in: Vignali et al. (Ed.), "Technology-Driven Sustainability. Innovation in the Fashion Supply Chain", pp. 7-25

Patagonia (2010), "Patagonia's Common Threads Garment Recycling Program: A detailed Analysis" available at: <https://eu.patagonia.com/de/de/stories/closing-the-loop-a-report-on-patagonias-common-threads-garment-recycling-program/story-19961.html> (accessed 16. May 2021)

Payne, A. (2015), "Open- and Closed-loop-Recycling of Textile and Apparel Products", in: Muthu, S.S. (Ed.): "Handbook of LifeCycle Assessment (LCA) of Textiles and Clothing", pp. 103-123

Radhakrishnan, S. et al. (2020), "Recycled Polyester: Tool for Savings in the Use of virgin raw Material", in: Muthu, S.S. (Ed.), "Environmental Footprints of recycled Polyester", pp. 49-59

Sympatex Technologies GmbH (2020a), "Factsheet Fluorcarbone. PTFE-freie Sympatex Membran", available at: <https://www.sympatex.com/newsroom/factsheets/> (accessed 16 May 2021)

Sympatex Technologies GmbH (2020b): „Factsheet Recycling. Closing the Loop: Sympatex und der geschlossene Wiederverwertungskreislauf“, available at: <https://www.sympatex.com/newsroom/factsheets/> (accessed 16 May 2021)

Sympatex Technologies GmbH (2020c): Weltpremiere zur ISPO 2020: Sympatex Technologie und Schoeller Textil präsentieren erste zirkuläre Funktionsjacke aus Alttextilien, München, available at: <https://www.sympatex.com/newsroom/pressemitteilung/weltpremiere-zur-ispo-2020-sympatex-technologies-und-schoeller-textil-praesentieren-erste-zirkulaere-funktionsjacke-aus-alttextilien/> (accessed 16 May 2021)

Technische Textilien, (2020), „PET/Polyester-Recycling: Anforderungen und Recyclinglösungen für die Wiederverwendung in Filamenten“, in: Technische Textilien, Issue 1, pp. 14-16

Watson, D. et al., (2017), "Textile-to-Textile-Recycling. Ten Nordic brands that are leading the Way", available at: <http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A1147645&dswid=7543> (accessed 16 May 2021)

Wittmann, M. (2020), "Statement zur Bvse-Alttextilstudie", available at: <https://www.bvse.de/gut-informiert-textil-recycling/studie-2020.html> (accessed 16 May 2021)