SORTING FOR RECYCLING

What & How

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INTRODUCTION

Non-reusable textile products might not make great clothes, but they can still be used as recycled materials.

Because there are several recycling methods (each with their own material-specific demands), the sorting process must be adapted depending on the process. In most cases, sorting is done manually, but a lot of progress has been made in the field of automated sorting.

Automated sorting has the potential to be much more precise and will lead to more consistent batches of sorted materials. Precision is important in this instance because better sorting means a more optimised recycling process.

COMMON SORTING CATEGORIES

Post-consumer textiles are a blend of materials, colours, structures and chemical components (e.g. dyes and finishes). When materials are sorted manually for recycling, sorters only use a few broad categories (like composition, colour and structure to separate textiles).

In the world of material recycling, 100% pure materials have a higher value than blends. For this reason, sorted groups include categories like 100% cotton, 100% wool, 100% polyester and 100% acrylic. After these categories, sorters identify the most commonly used blends, such as cotton-polyester, polyester-wool and wool-acrylic.

When sorting based on colour, white products have a higher value compared to coloured ones (because white products can be dyed). Colour sorting might include categories like white and black; the three primary colours (i.e. red, yellow, and blue); and some secondary colours like green or purple.

When it comes to fabric structure, products are sorted into categories like wovens and knits. Within these categories, one might separate fabrics with a loose, open structure from the more tightly woven and knit fabrics.

If you'd like to know more about sorting categories, further processing, and potential end-products, ECO-TLC in France has produced a nice overview, which can be found on the Refashion website here.

AUTOMATED SORTING
RECENT DEVELOPMENTS & THE FUTURE

A recent development in the recycling industry is the automated sorting of post-consumer textiles. Currently, there are a few automated textile sorting machines in operation, like the Fibersort by Wieland Textiles and the Siptex system in Malmö (Sweden) operated by a consortium of Swedish companies.

In the automated sorting process, the textile product is analysed by Near Infrared Technology. After this analysis, in theory, the resulting parameters can be used as sorting criteria. When combined with optical inspection by a human, most sorting categories obtained during manual sorting can be reproduced by automated sorting.

Because the technology is still under development, it is expected that the number of sorting criteria will be expanded to include criteria that cannot be identified by manual sorting (like the chemical composition of the dyes used and the chemical nature of finishes present on the textile product). These criteria are important for improving the recycling process and especially for the chemical recycling of post-consumer textile waste.

RECYCLING
DIFFERENT METHODS & THEIR LIMITATIONS

Non-reusable textiles must be sorted both in order to improve the quality of the end product and to make certain recycling processes possible. For instance, the recycling of thermoplastic fibres like polyester and polypropylene by extrusion is only possible if the input exclusively contains these thermoplastics. Cotton and other non-meltable fibres will only clog the system.

In mechanical recycling, the quality of the resulting fibres is much higher when a well-sorted, narrowly defined stream is used as input. The mechanical recycling of jeans is quite well established for this reason. Knowing which dyes and finishes are present in sorted groups makes this process even easier.

Recycling technologies, their limitations regarding input, and the characteristics of what is produced will be described in more detail in other chapters of this series.

Above: *Textile waste must be sorted by colour and composition before recycling. Sorting is usually done manually, but technological advancements mean that automatic sorting will be more prevalent in the future.*

WANT TO KNOW MORE?

Have we piqued your curiosity? If so, you can check out some of the resources below to find out more about how textiles are sorted for recycling.

SOME SORTERS

- Boer groep (https://www.boergroup.eu/)
- Wieland Textiles (https://www.wieland.nl/)
- Circulus Berkel / Reshare (https://www.reshare.nl/english)
- Regionaal Textielsorteercentrum Twente (joint venture of Het Goed en De Beurs)

MORE INFORMATION

- Fibersort (https://www.wieland.nl/en/innovation-fibersort/)
- Automated sorting Malmö: (PDF)
- The sorting process (in Dutch): (https://www.wieland.nl/gebruikte-textiel-sorteren/)

TEXTILE RECYCLING INCREASED

FROM LESS THAN

10% IN 2000

TO MORE THAN

35% IN 2020

#facts&figures