TexUV-Cleaner: Disinfection of Recycled Fibres from Post-Consumer-Textiles

Autors: Loraine Labus[1, 2], Prof. Dr. Ing. Mesut Cetin[1, 2]
[1] Institut für Textiltechnik Augsburg gGmbH, [2] Technische Hochschule Augsburg

From old to New

Used clothing collected in textile containers is a valuable raw material for recycled yarns. In mechanical recycling, the garments are torn into fibres **without prior washing or disinfection**, only visibly soiled items are sorted out. However, textiles without visible contamination can still carry a considerable microbial load, which may lead to odour formation, skin irritation or infections.

The **aim** is an automated, contactless disinfection of recycled fibres during recycling.

Concept: TexUV-Cleaner

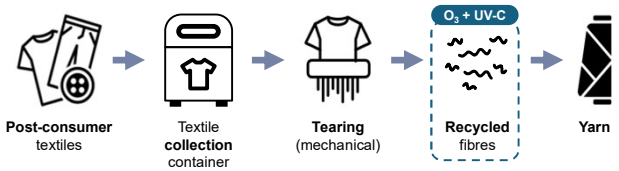


Fig. 1: Mechanical recycling of post-consumer textiles; the TexUV-Cleaner adds a disinfection step for the torn fibres.

Torn fibres are conveyed pneumatically through a pipe at constant pressure. **Ozone** is introduced as a gas through an inlet; a **UV** lamp irradiates the fibres through a window in the pipe wall and also degrades residual ozone.

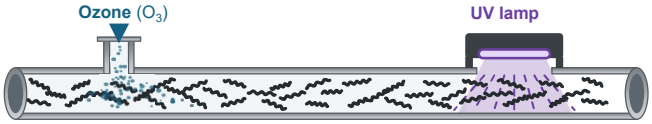


Fig. 2: Schematic of the TexUV-Cleaner in the pneumatic fibre transport pipe.

Methods: Contact plate sampling



Fig. 3: Contact plate after incubation

- 284 contact plates (21.5 cm²) from used cloth and home textiles
- 17 clothing categories, 15 material compositions
- Incubation and counting of colony-forming units (CFU)
- No CFU were detected in 16 samples; in 4 samples, the CFU count exceeded 150

Table 1: Reference values and samples above each value (n = 284)

	Surgical clothing [1]	Food industry limit value [2]	Food industry orientation value [2]	Hospital limit value [2]	Hospital orientation value [2]
CFU/100 cm²	300	50	30	20	10
CFU/21.5 cm²	65	10.75	6.45	4.3	2.15
Samples above value (n = 284)	22 (8 %)	114 (40 %)	150 (53 %)	177 (62 %)	223 (79 %)

Results: Microbial load of used textiles

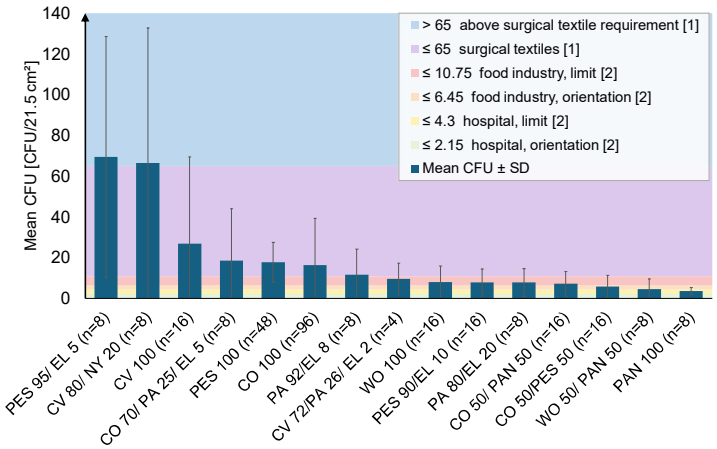


Fig. 4: Influence of material composition on the quantitative microbial load (mean ± SD).

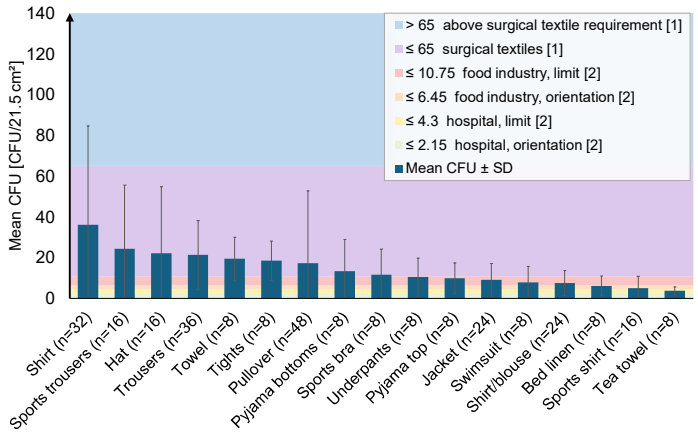


Fig. 5: Influence of garment category on the quantitative microbial load (mean ± SD).

- **Material:** mean values for PES 95/EL 5 (69 CFU) and CV 80/NY 20 (66 CFU) exceed the requirement for surgical textiles; PAN 100 (4 CFU) is below the limit value for hospital textiles.
- **Garment category:** the mean value for shirts (36 CFU) exceeds all limit and orientation values for food-industry and hospital textiles; tea towels (4 CFU) are below the limit value for hospital textiles.
- **Variability:** high standard deviations, amplified by individual high values in small groups, limit the comparability between groups.

References

[1] DIN EN 13795-1:2025 Surgical clothing and drapes – Requirements and test methods – Part 1: Surgical drapes and gowns
[2] Vossebein, L.: Textilhygiene. Prakt. Arb.med. 2008; 13: 12–14

Partner

Institut für Textiltechnik Augsburg gGmbH
Am Technologiezentrum 5
86159 Augsburg
www.ita-augsburg.com

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