



Mastering the Short Fiber Challenge

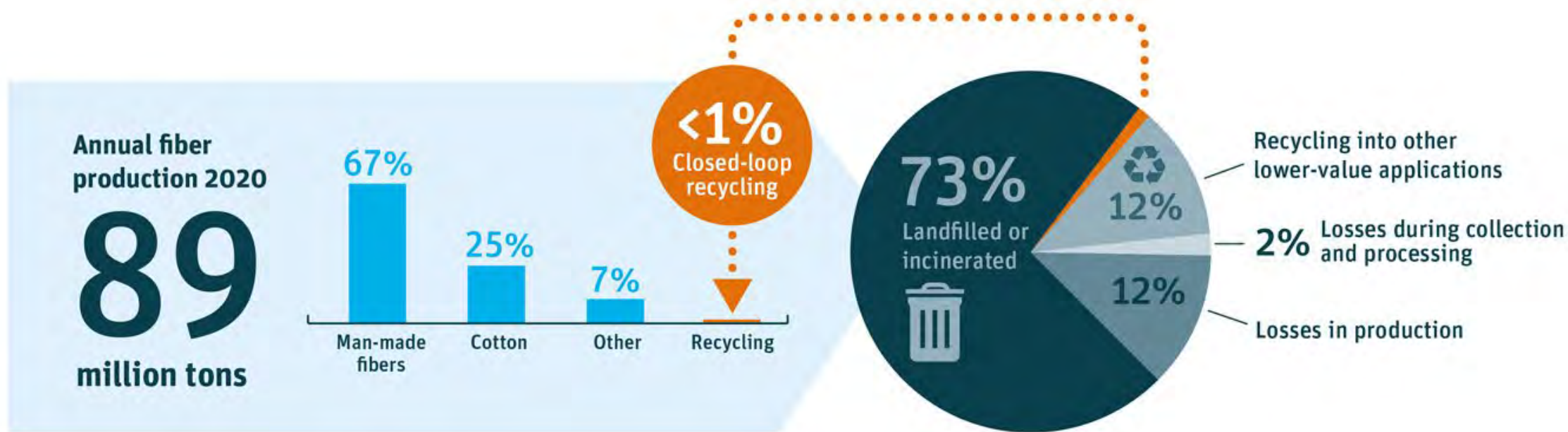
Pre-ITMA Press Conference 2023, Bern

Franziska Häfeli, Head Marketing & Systems Rieter Machines and Systems, March 18, 2023

Recycling Industry Today

A significant growth potential

- Nearly three quarters of all garments end up in landfills
- Out of the 89 million tones annual fiber production, **only 1%** is recycled from pre- or post-consumer textiles
- The recycling potential is estimated to be **more than 15%**
- EU Strategy for Sustainable and Circular Textiles with ambitious goals



Source: Ellen Macarthur Foundation, A new textiles economy: Redesigning fashions future
Textile Exchange – Preferred Fiber and Materials Market Report 2021

Two Ways to Open Fibers



Chemical Recycling

- Emerging process for cotton waste and recently also for blended waste
- Breaks down fibers into chemical building blocks
- Requires wet spinning new fibers from a pulp similar to conventional viscose process
- Or melt spinning of PET pellets to polyester yarn

Mechanical Recycling

- Mechanical tearing of pre- and post-consumer goods
- Cut in pieces and then torn by cylinders into fibers
- Roots in the downcycling business (more aggressive opening)



Spinning Short Fibers Is a Challenge

Virgin cotton

Short-staple cotton

- Short-fiber content: 24.6%
- Av. fiber length: 20.6 mm
- Long fiber length: 33.2 mm



Spinnability today:

Standard

Yarn waste

Yarn waste

- Short-fiber content: 46.9%
- Av. fiber length: 14.5 mm
- Long fiber length: 28.5 mm



Mechanical recycling

Challenging

Post-consumer – cotton

T-Shirt, sorted, white

- Short-fiber content: 71.3%
- Av. fiber length: 9.8 mm
- Long fiber length: 22.5 mm

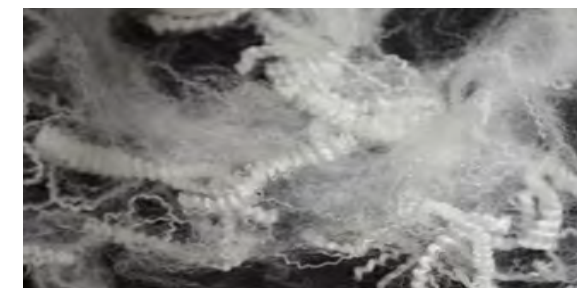


Limited

Recycled polyester

PET bottles

- Short-fiber content: 0.3%
- Av. fiber length: 34.2 mm
- Long fiber length: 41.0 mm



Chemical recycling

Standard

Typical Spinning Process for Short Fibers: Rotor

Rieter rotor spinning system for recycling

- Spinners have been using the rotor spinning process for decades for recycled material
- Many did not even claim to use recycled material → save raw material cost
- Rotor spinning is best suited for processing material with a high short-fiber content



Blowroom
VARIOline



Card C 80 with
RSB-Module 50



Rotor spinning
R 37 or R 70



Way Forward: Recycling Goes Ring Spinning (1/2)

Rieter ring spinning system for recycling

- Increasing demand also for recycled ring yarns (wider application range)
- Higher tenacity of ring yarn → go into weaving
- Different, softer touch, finer counts
- Possibility for core yarn (stretch) on the end spinning machine
- But very challenging due to neps and high short fiber content



Blowroom
VARIOLine



Card
C 80



Draw frame
Auto leveling
RSB-D 50



Roving frame
F 40



Ring spinning
G 38 with
COMPACTdrum



Winder
AC X6



Sample garment from Texcircle project:
Rohner Sport Socks
Ring Ne 20, 50% baker trousers, 50% Refibra

Way Forward: Recycling Goes Ring Spinning (2/2)

Cooperation with top quality denim manufacturer to test adaptations along the value chain

- Sample yarns with the Rieter ring spinning system:
Denim Ne 7-12 with 80/20% virgin cotton/post-consumer (bleached)
- First achievements: improved yarn quality (reduced IPIs, lower short-fiber content): Settings on card, draw frame, roving and compact-spinning
- Target: Use 50% share of recycling materials
Trials and improvements ongoing along the entire spinning process

➔ **Mastering the short fiber challenge**



Com4recycling for High Quality Recycled Yarns

Yarns spun on Rieter spinning systems for recycling deserve a brand

Com4 recycling-ring



Com4 recycling-compact



Com4 recycling-rotor



Com4® – The Yarn Brand

- Worldwide registered trade mark by Rieter
- For quality yarns spun on Rieter spinning systems and apparel made out of it
- Customers who would like to use the brand can participate in the Com4® licensee program

ITMA 2023 – Invitation Unveiling Event



You are cordially invited to join the unveiling event where we will present for the first time ever key technology highlights:

Date: Thursday, June 8, 2023

Time: 10:00 a.m.

Place: Booth H1-C206

Topics:

- Innovative solutions supporting technology leadership
- Focus on cost per kg yarn: raw material, energy consumption, automation
- System integration through digitization
- Recycling

