

Innovative by nature

**Optimizing the mechanical performance and flushability
of wipes containing lyocell shortcut fibers**
VEOCEL™ Lyocell with Eco Disperse Technology

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Agenda

- LENZING™ wood-based cellulose fibers
- VEOCEL™
- Flushable wipes
- VEOCEL™ Lyocell with Eco Disperse technology
- VEOCEL™ Lyocell – not only suitable for flushability
- Conclusion

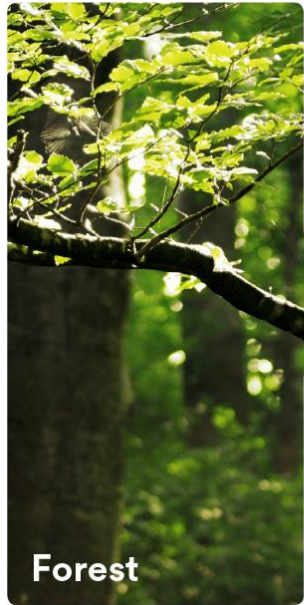
The Lenzing Group

The Lenzing Group is an international company that produces **high-quality fibers** from the renewable **raw material wood** with **environmentally friendly** and **innovative technologies**.

These fibers form the basis for a wide range of **textile** and **nonwoven applications**, and are also used in **work** and **protective wear** and in **industrial applications**.



Lenzing fibers produced from the raw material wood



Purely for you - VEOCEL™



strength

absorbency

biodegradability

**blending
partners**

liquid management



Purely for you

**clean
and safe**

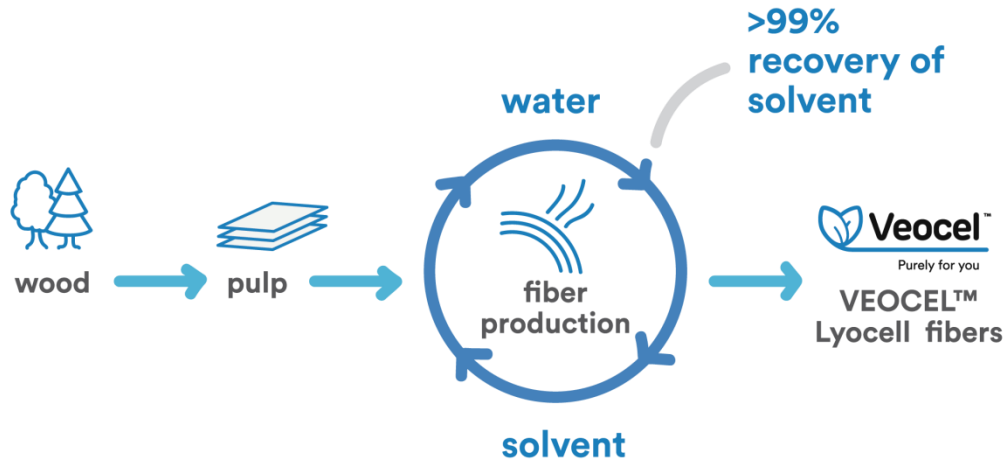
handfeel

gentle on skin

**contribution to
breathability**

Sustainable production process of VEOCEL™ Lyocell

VEOCEL™ Lyocell production process





- Direct dissolution process
- Closed-loop process
- > 99% recovery of solvent





Unlocking the potential



 biodegradable

 botanic origin

 social responsibility

 sustainable production



eco message

more competitive products

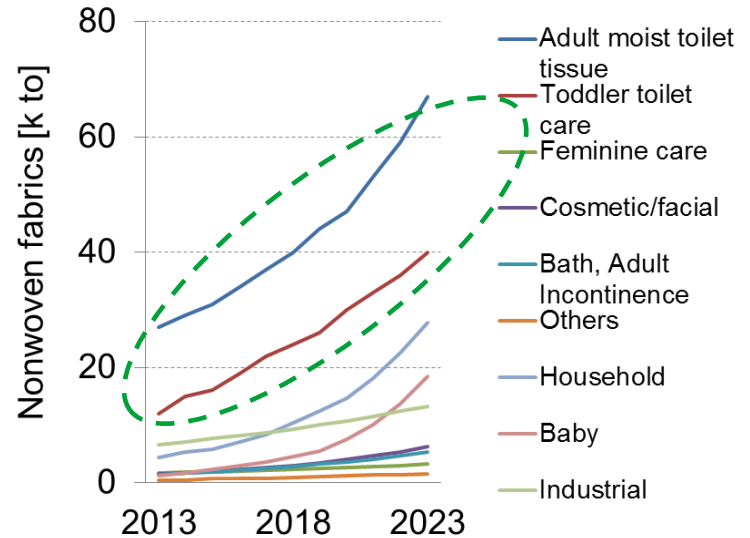
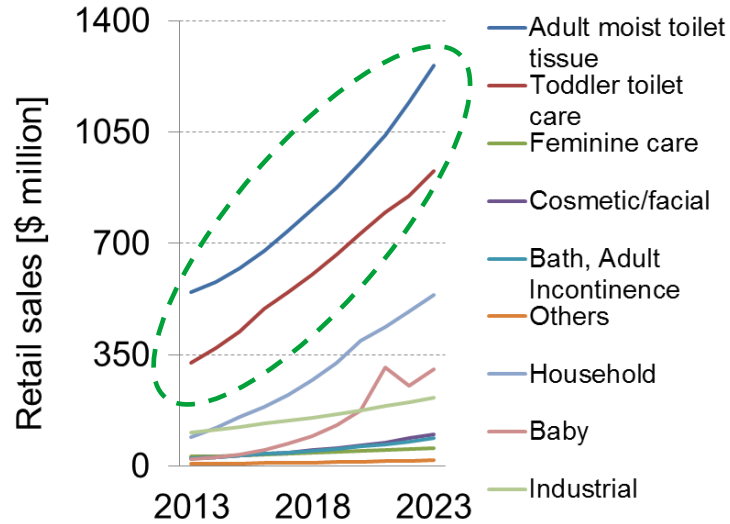
higher perceived quality

Flushable Wipes



Flushable wipes

Retail sales and nonwoven volume for sub-segments



Source: Smithers Pira, The Future of Flushable Wipes to 2023, Phillip Mango

Clogging of sewers

Several million € costs per year for sewer damages



Umweltfreundliche Feuchttücher aus Lenzing

Feuchttücher verursachen in Kanalisation und Kläranlagen Schäden in Millionenhöhe. Hygienekomfort wird durch die Ignoranz der Konsumenten zum teuren Problem. Die Lenzing AG versucht mit einer Innovation, dem abzuwehren.

Ein Feuchttuch hat eigentlich nichts in der Toilette verloren. Um es stabil und reißfest zu machen, wird es aus einem Gemisch von Kunstfasern und natürlichen Fasern oder mit Kunststoffen behandelten Fasern hergestellt. Die Tücher halten ewig, verstopfen Kanäle und Pumpen und sorgen dafür, dass immer mehr Kunststoffmüll in die Natur gelangt.



Source: <https://ooe.orf.at/news/stories/2923275/>

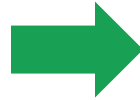
Consumer Education

INDA/EDANA Code of Practice



non-flushable

flushable



vs.



How to assess flushability?

INDA/EDANA GD4 - 7 Tests to be passed:

- FG501- Toilet Bowl and Drain-line Clearance
- FG502- Slosh Box Disintegration Test
- FG503- Household Pump Test
- FG504- Settling Test
- FG505A- Aerobic Biodisintegration Test
- FG506A- Anaerobic Biodisintegration Test
- FG507- Municipal Sewage Pump Test



VEOCEL™ Lyocell

with Eco Disperse technology

VEOCEL™ Lyocell with Eco Disperse technology

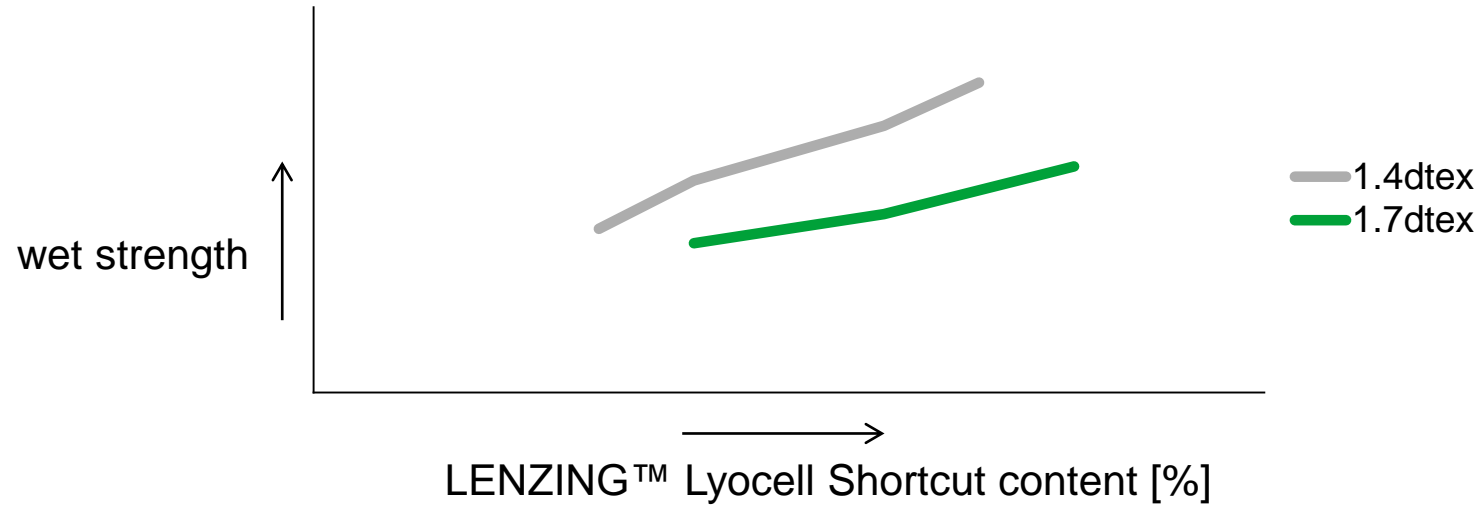


Eco Disperse technology
for products containing
VEOCEL™ Lyocell Shortcut

- **Strong in use**
- **Quick disintegration**
- **Biodegradable**

LENZING™ Lyocell Shortcut

Blend Ratio Selection

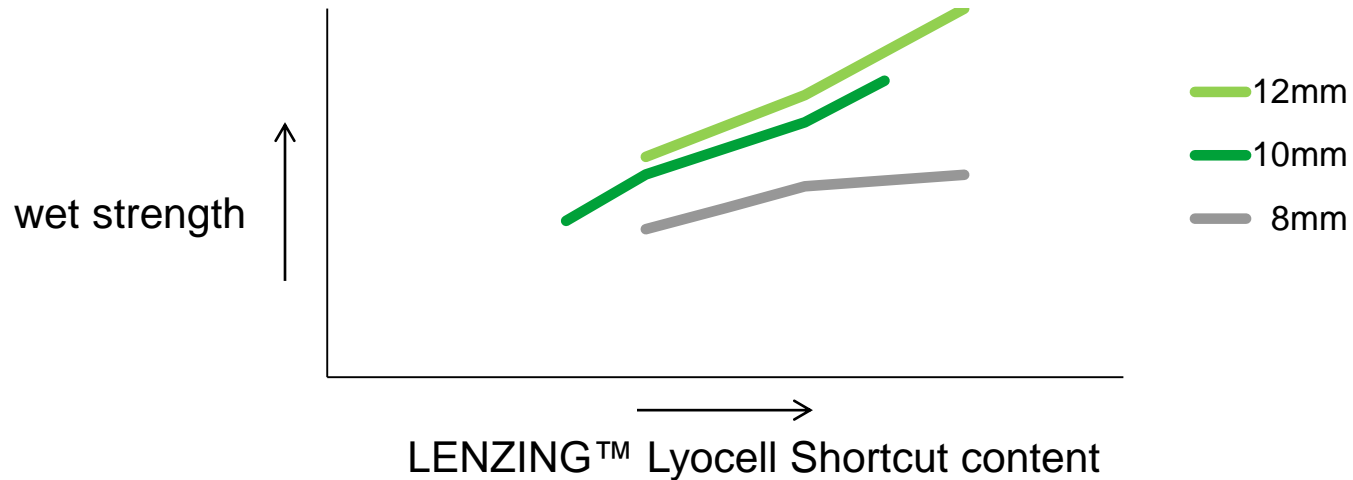


Wet strength of fabrics can be adjusted by fiber titer and content

LENZING™ Lyocell Shortcut

Fiber Grade Selection - Cut Length

LENZING™ Lyocell Shortcut 1.4 dtex at 15 - 40% in blends with 60 - 85% wood pulp

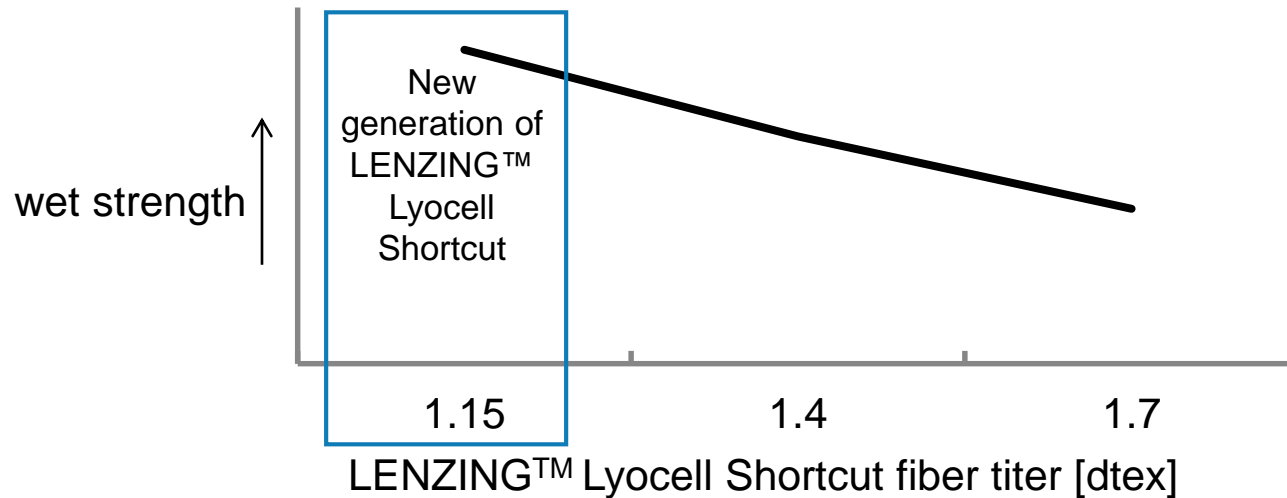


Wet strength of fabrics rises with the cut length of fibers

LENZING™ Lyocell Shortcut

Fiber Grade Selection - Titer

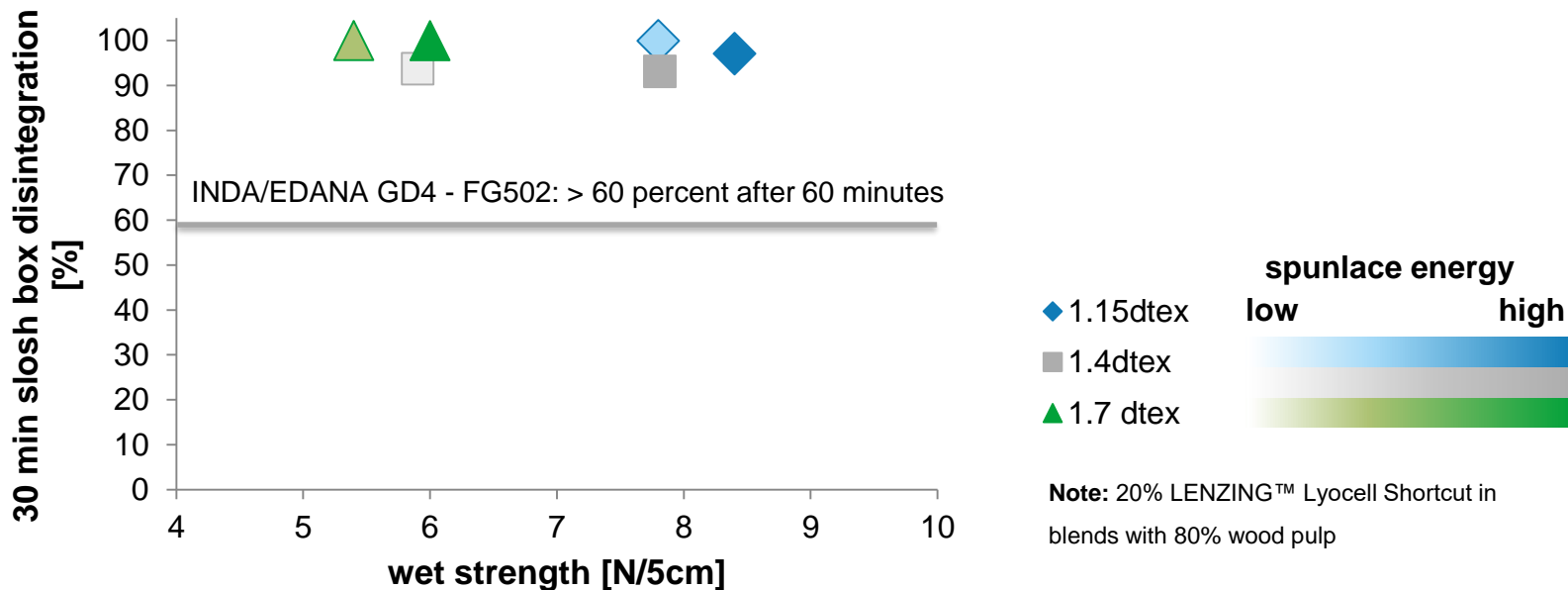
20% LENZING™ Lyocell Shortcut at 10 mm cut length in blends with 80% wood pulp



Fine dtex fibers lead to higher wet strength of fabrics

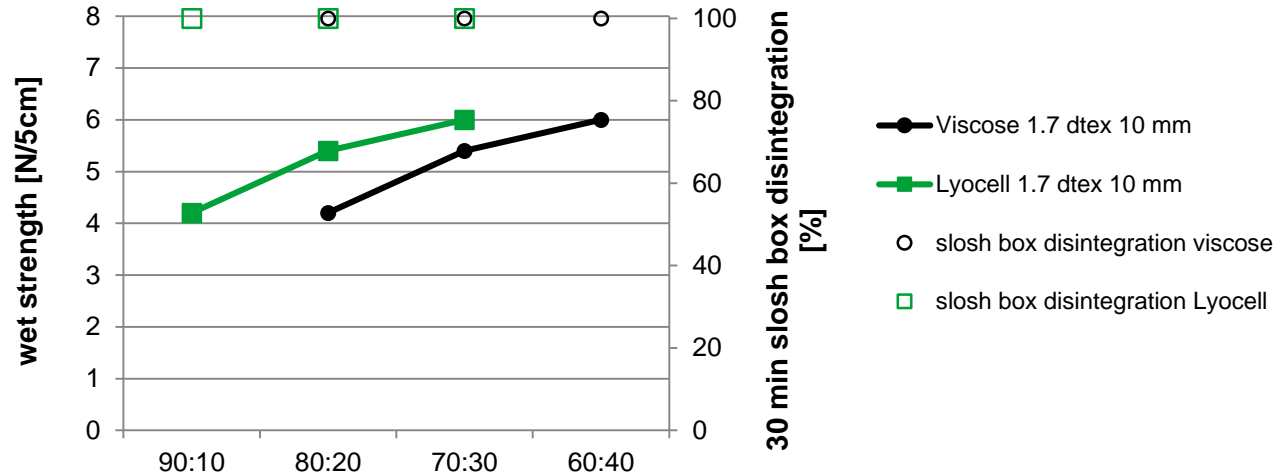
LENZING™ Lyocell Shortcut

Fast disintegration at high wet strength: > 90 percent after 30 minutes



LENZING™ Lyocell Shortcut vs. Viscose Shortcut

Fabrics (60gsm) with 1.7 dtex/10 mm fibers of Viscose and Lyocell, produced at identical settings



LENZING™ Lyocell: Higher wet strength using less fibers in blends with pulp

VEOCEL™ Lyocell Shortcut

Parameters	80% Pulp 20% LENZING™ Lyocell	80% Pulp 20% Viscose	> 80% Pulp < 20% Binder
High wet strength	+++	+	---
No use of synthetic binders	+++	+++	Depends on type and amount of binder
Quick disintegration	+++	+++	
Biodegradability	+++	+++	Depends on type of binder

20% LENZING™ Lyocell Shortcut fibers enable products with excellent quality, performance and lower costs

Moist toilet tissues with VEOCEL™ Lyocell

meeting all requirements

Wipes containing VEOCEL™ Lyocell

- Balanced mechanical properties: **strong in use** ↔ **fast disintegration**
- Botanic origin: **fully biodegradable**

Flushability Test according to INDA/GD4, tested at IPS (USA):

Flushability Assessment (GD4)	E33_18_0355_01
FG501-Toilet Bowl and Drain-line Clearance Test	Pass
FG502-Slosh Box Disintegration Test	Pass
FG503-Household Pump Test	Pass
FG504-Settling Test	Pass
FG505A-Aerobic Biodisintegration Test	Pass
FG506A-Anaerobic Biodisintegration Test	Pass
FG507-Municipal Sewage Pump Test	Pass

VEOCEL™ Lyocell

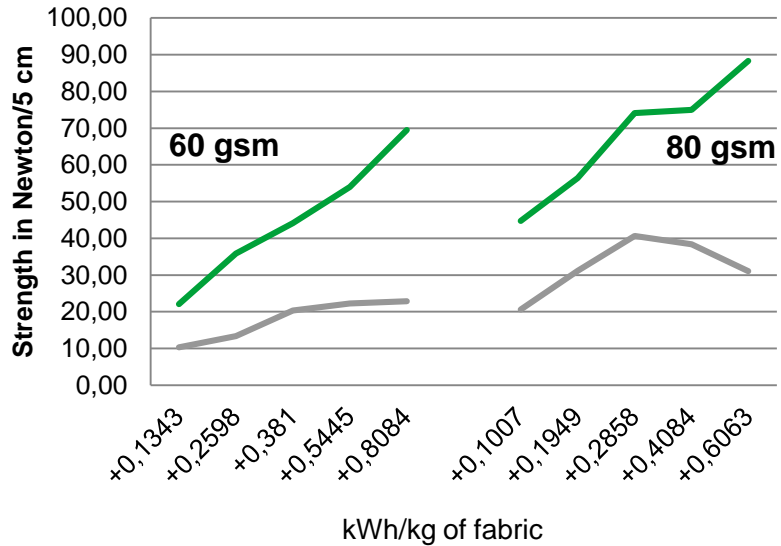
not only suitable for
flushability

VEOCEL™ Lyocell Shortcut Wet laid products are not only flushable

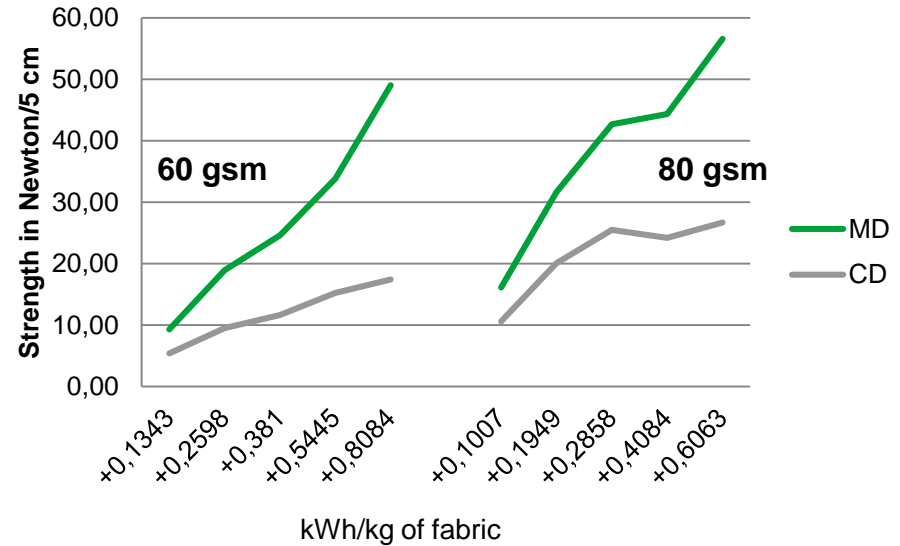
- Lyocell blends can also create fabrics with high wet and dry strength
- Variations in increased hydroentangling energy applied to these fabrics allow to tailor high strength and sustainable fabrics
- Blending ratios from 80/20 to 50/50 perform excellent
- No chemical binders needed

Increased mechanical properties

Dry fabric strength - 70/30 blend at different energy consumptions



Wet fabric strength - 70/30 blend at different energy consumptions



Opening new possibilities for sustainable wipe application

Conclusion

VEOCEL™ Lyocell provide biodegradable tailor made wet laid fabrics by:

- use of LENZING™ fiber portfolio
- adjustment of fabric composition and hydroentangling energy
- tuning wet strength and mechanical properties opening new possibilities for sustainable dispersible and non-dispersible wipes.



Thank You

**for your
attention!**

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