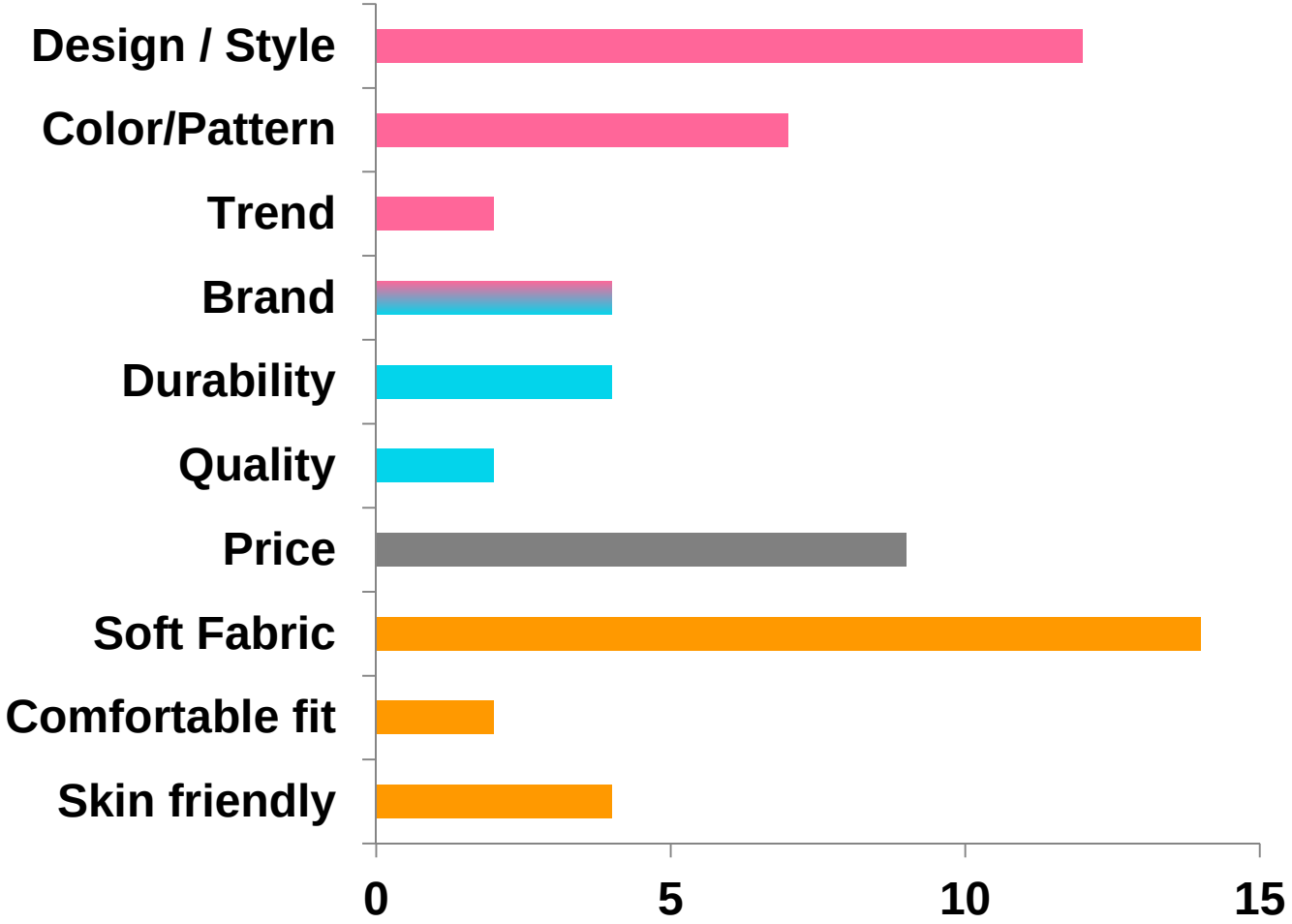
How softness sounds

What consumers want: **Softness**



Source: Lenzing customer survey, n 23

What is „softness“?

What is Soft?

Dictionary:

Not hard or stiff

Smooth and producing agreeable sensations

Pleasant or comfortable: agreeable touch

Yielding readily to touch or pressure; easily penetrated, divided, or changed in shape

➔ Subjective value; related to comfort

➔ How to put it in numbers?

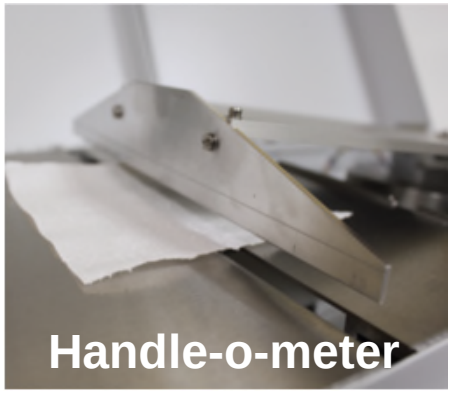
Relevant physical values

- Thickness
- Compression
- Bending
- Surface friction
- Roughness
- Shearing
- Thermal properties

Kawabata: for daily use too complicated

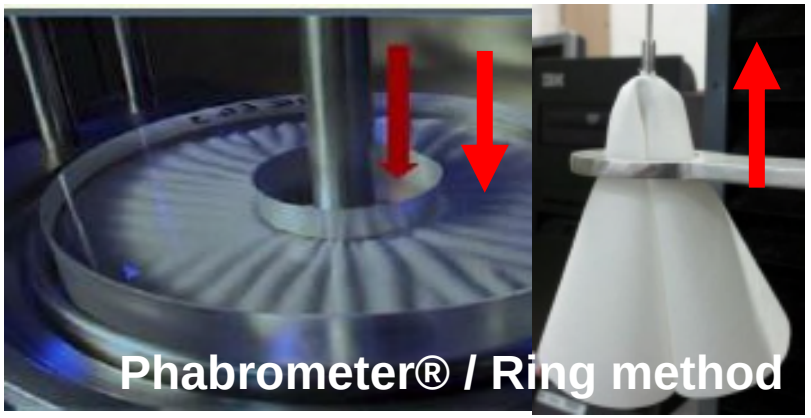
- Can measure up to 16 independent mechanical properties of a fabric
- FAST: 3 (simpler) instruments

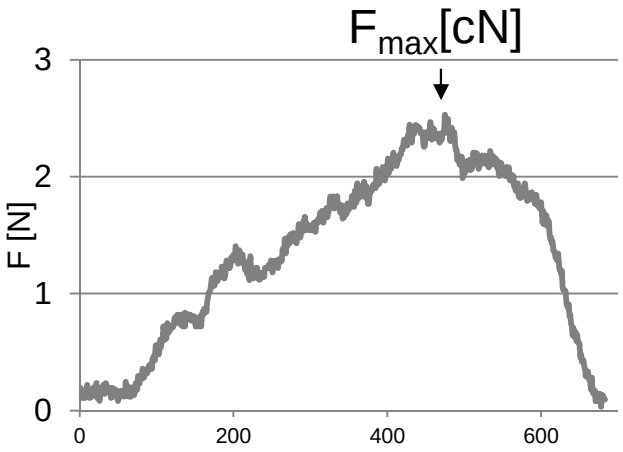
Physical methods

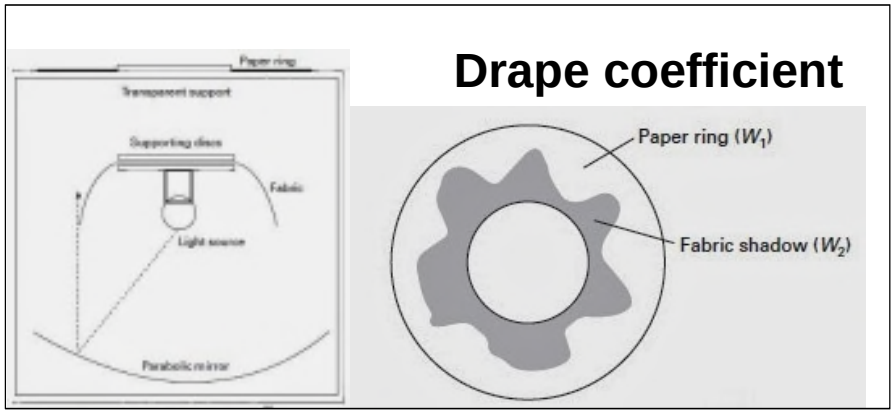


Relevance:

Thickness
Compression
Bending
Surface friction
Roughness
Shearing
Thermal properties







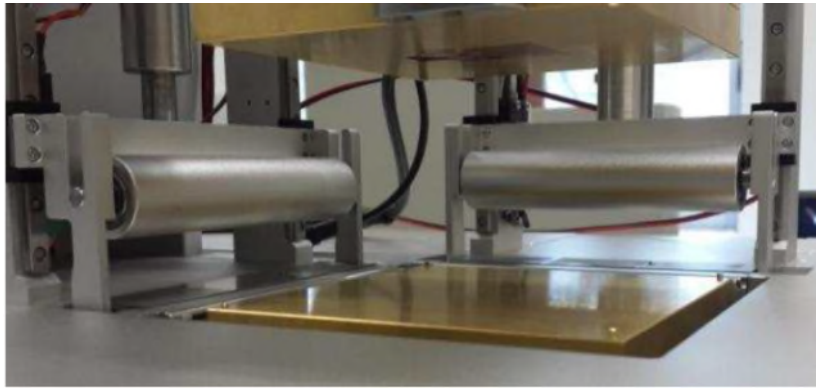
Fabric Touch Tester FTT

Measured:

- Thickness
- Compression
- Bending
- Shearing
- Surface friction
- Roughness
- Thermal properties

Calculated:

- Active smoothness
- Softness
- Warmness

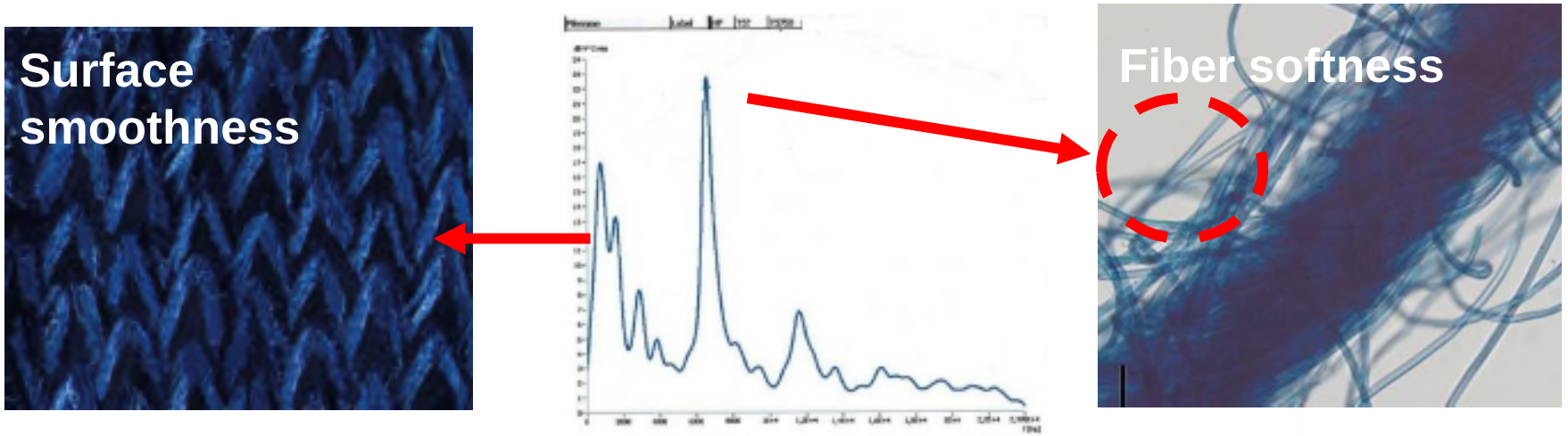


A new approach:

Hear the Softness!

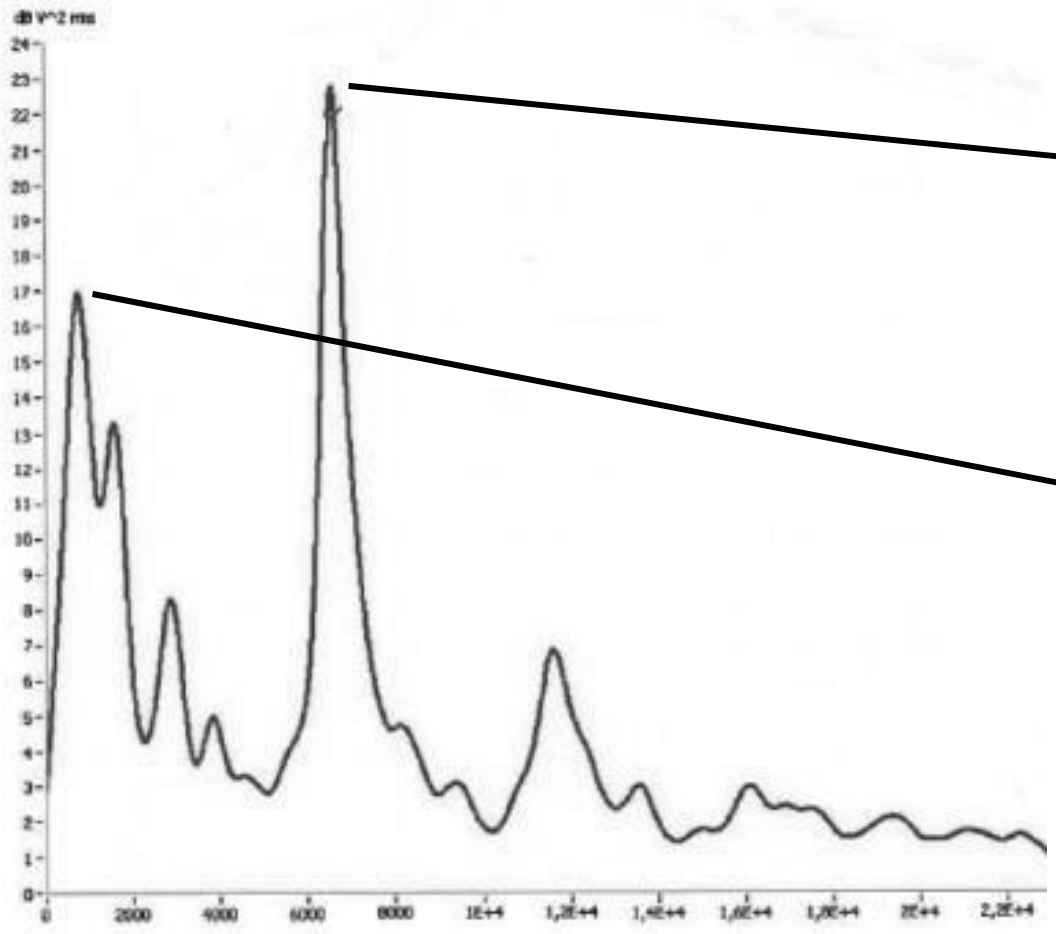
New method:
Tissue Softness Analyzer (TSA)

lower noise peak
=> smoother / softer



New method:
Tissue Softness Analyzer (TSA)

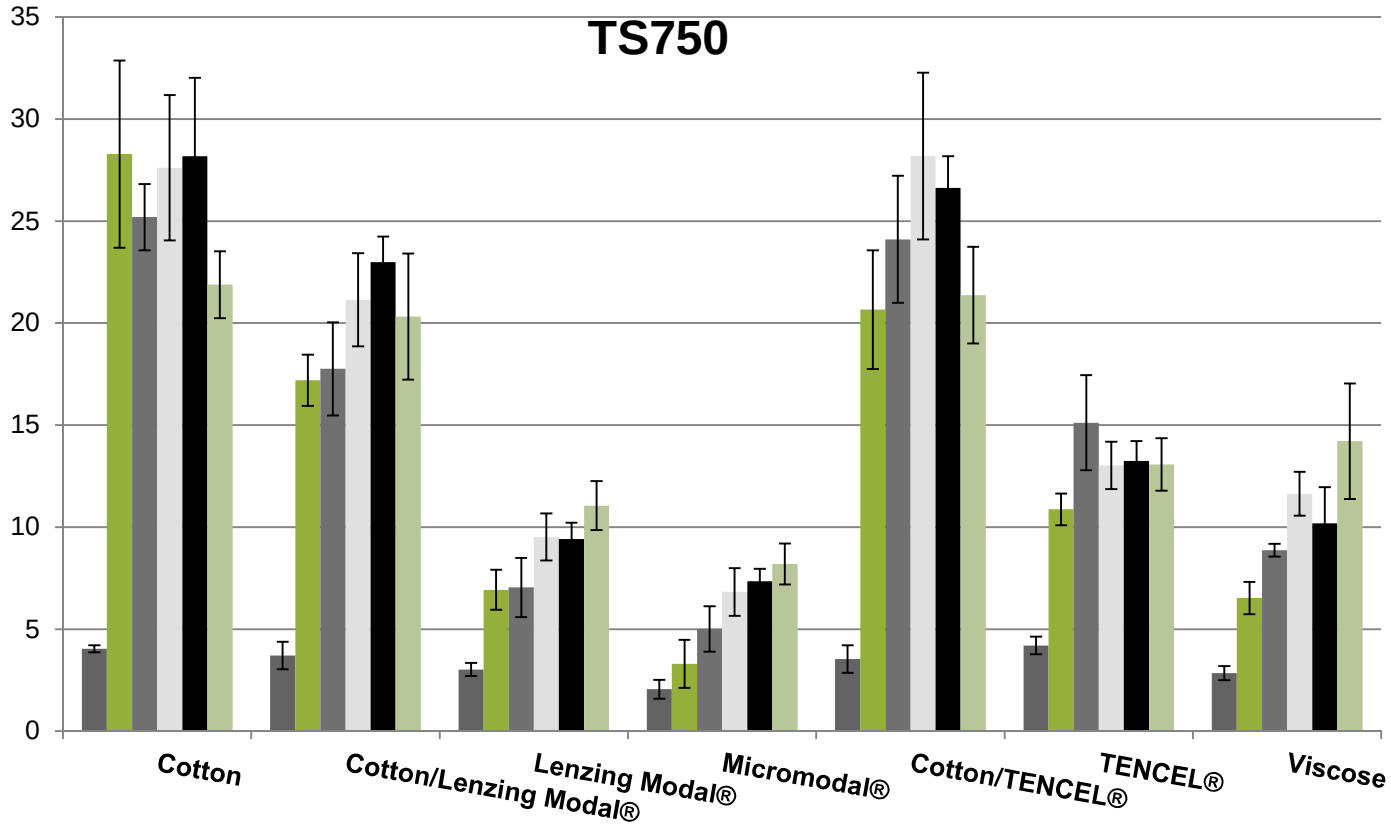
The lower the noise, the softer the fabric



Fiber softness

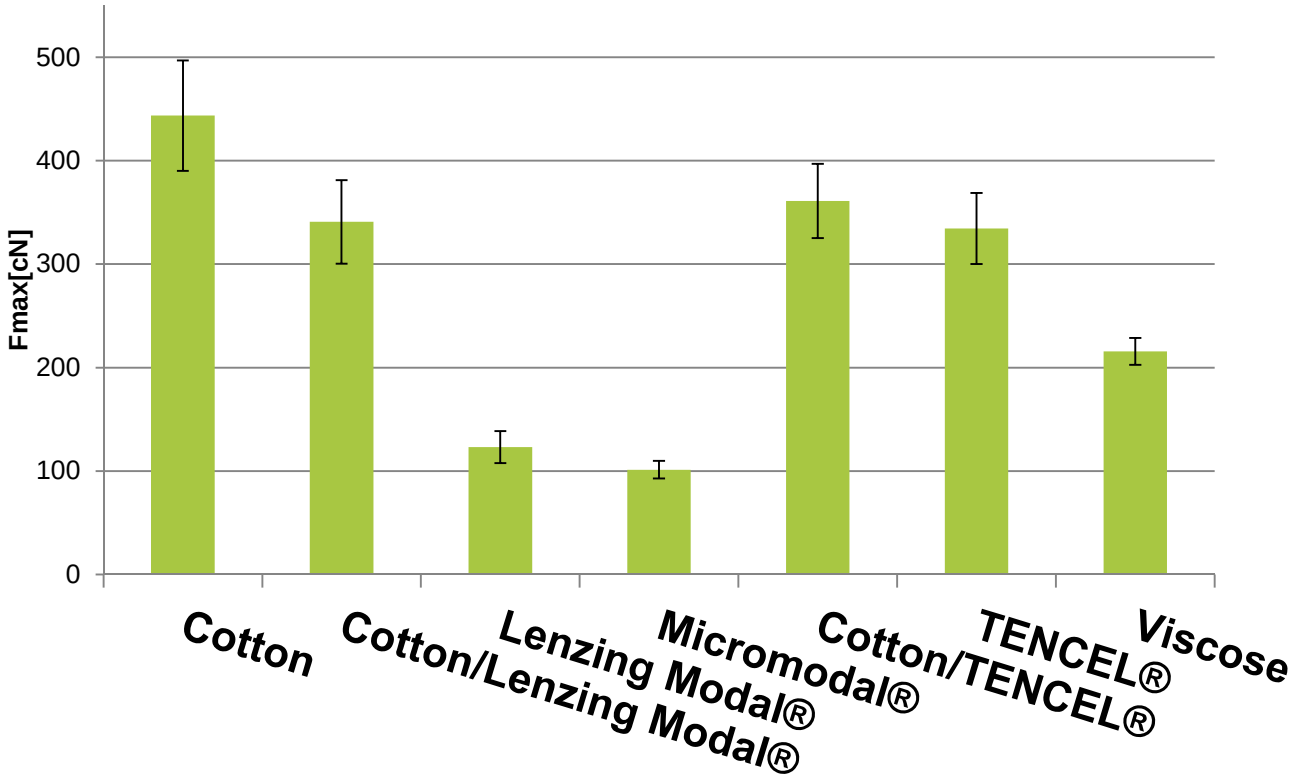
Surface smoothness

Example1:
Knitted fabric, repeated washing



**Lenzing Modal® and Micromodal®
are permanently soft**

Control: ring pull-through



Example 2:
Woven fabric – method comparison

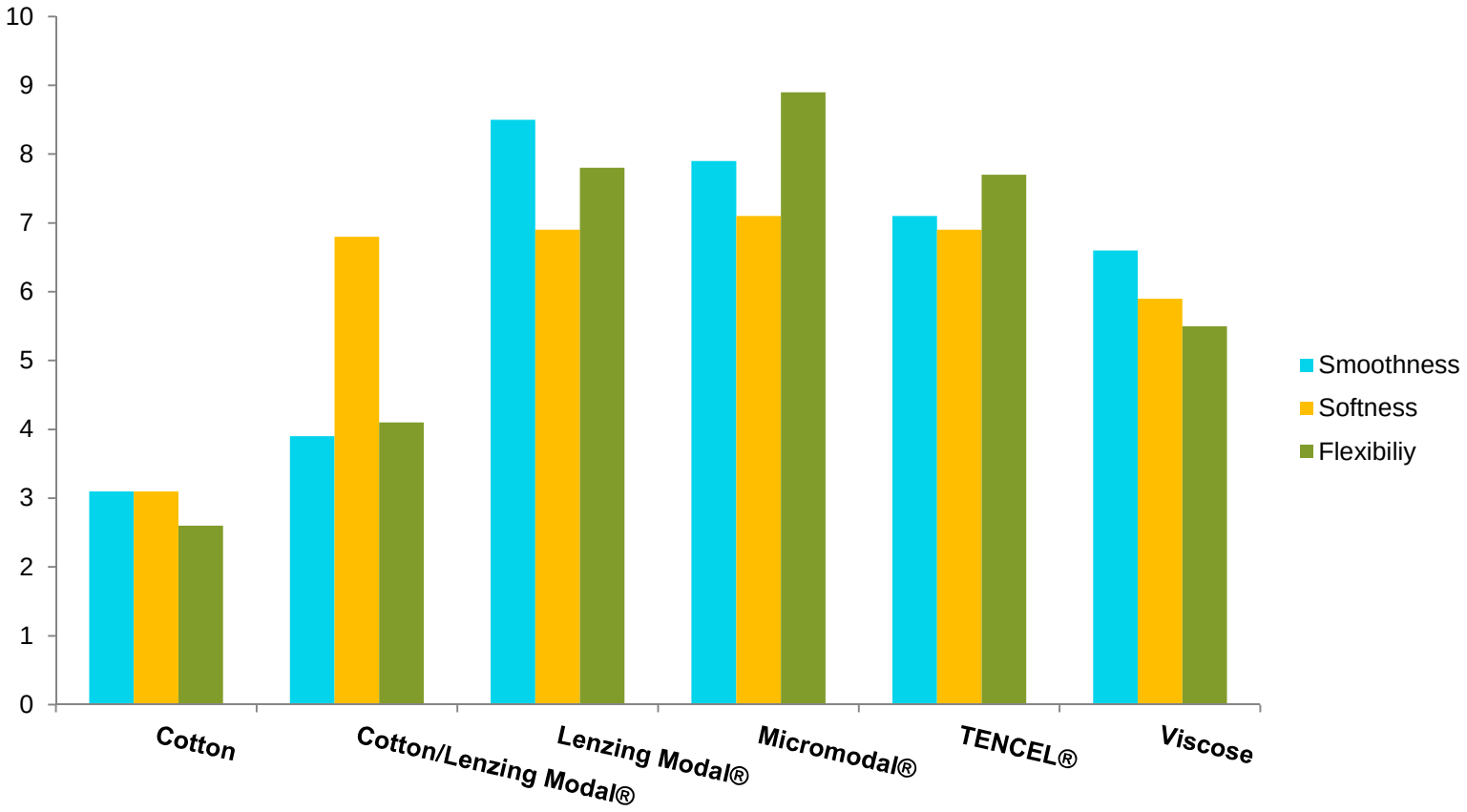
Fabric	Weight [g/m²]	Thickness [mm]
Cotton (CO)	131	0.42
Cotton/Modal (CO/CMD)	142	0.46
Modal (CMD)	141	0.32
Micromodal® (µCMD)	130	0.34
TENCEL® (CLY)	131	0.36
Viscose (CV)	143	0.35

Applied methods:

- Expert panel
- Non-expert panel
- FTT
- TSA
- Ring method
- Handle-o-meter
- Drape test

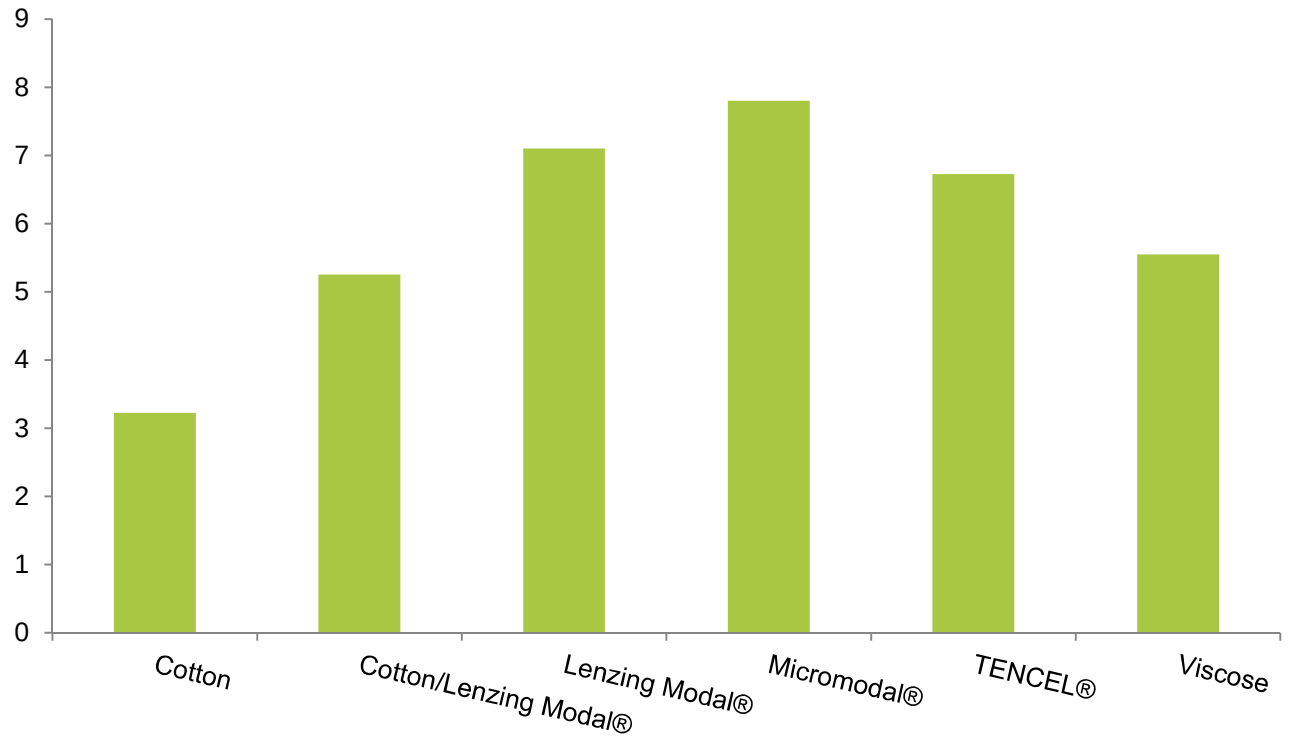
Expert panel evaluation and FTT measurements were performed at University Gent within the European project „TOUCHÉ“

“Touché”*- Expert panel: Lenzing Modal® is the softest



- 10 expert assessors
- The fabrics were assigned scores between 1-10.

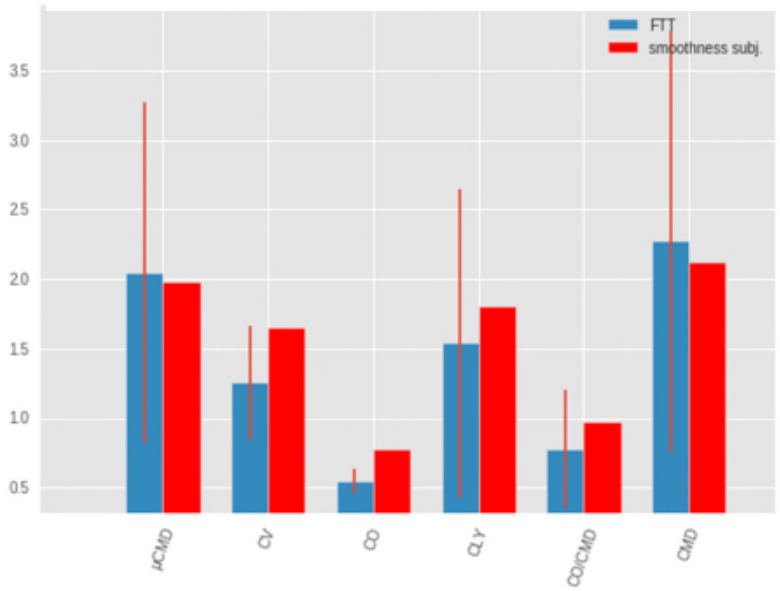
Softness: Lenzing Modal is superior

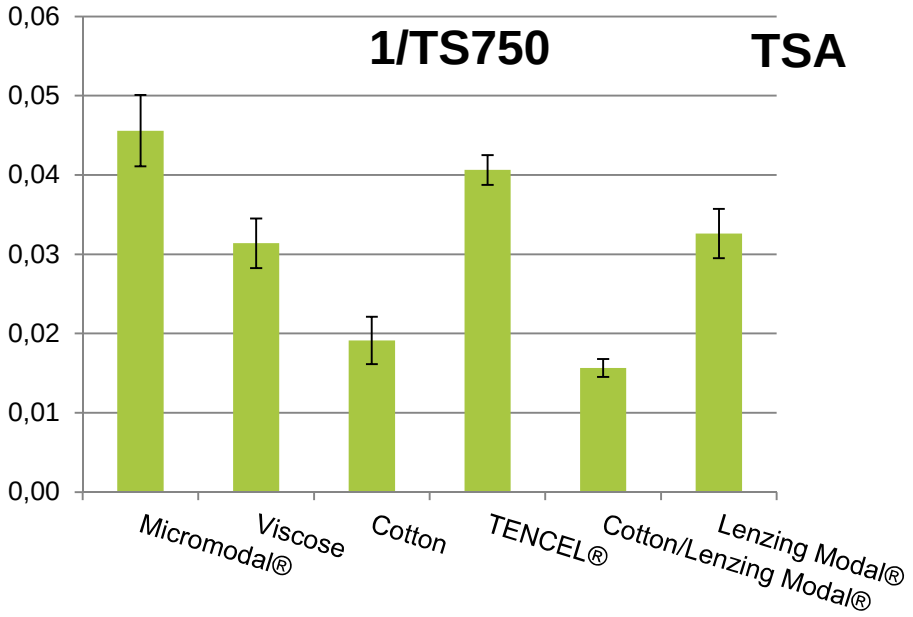


- 10 expert assessors
- The fabrics were assigned scores between 1-10.

Smoothness: FTT versus TSA

FTT versus **panel test**

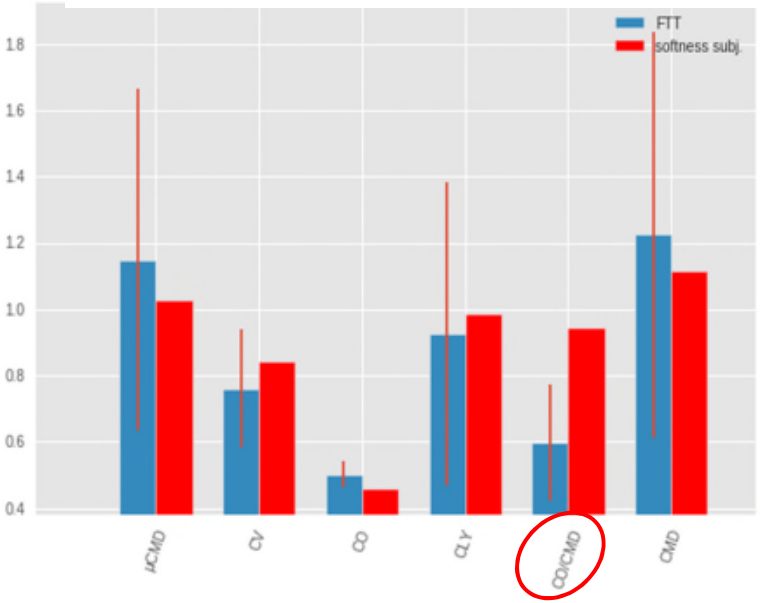


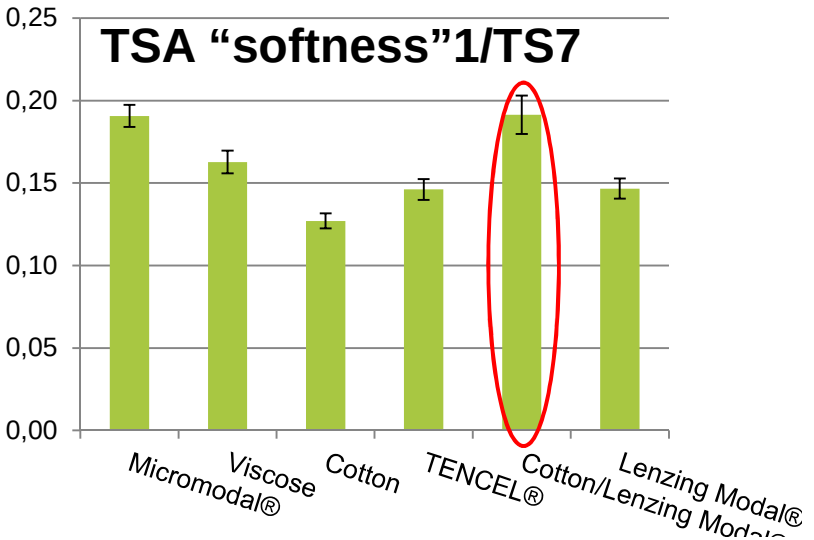


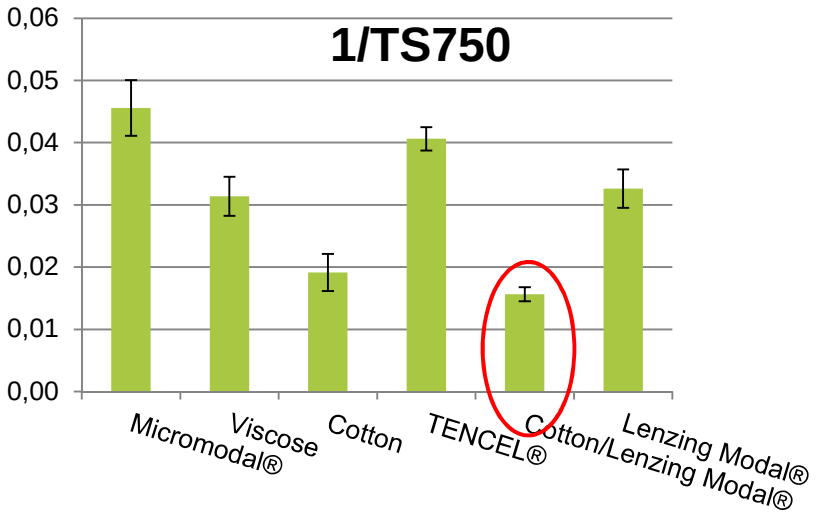
Similar ranking of the sample smoothness in panel, FTT and TSA

Softness: FTT versus TSA

FTT versus **panel test**



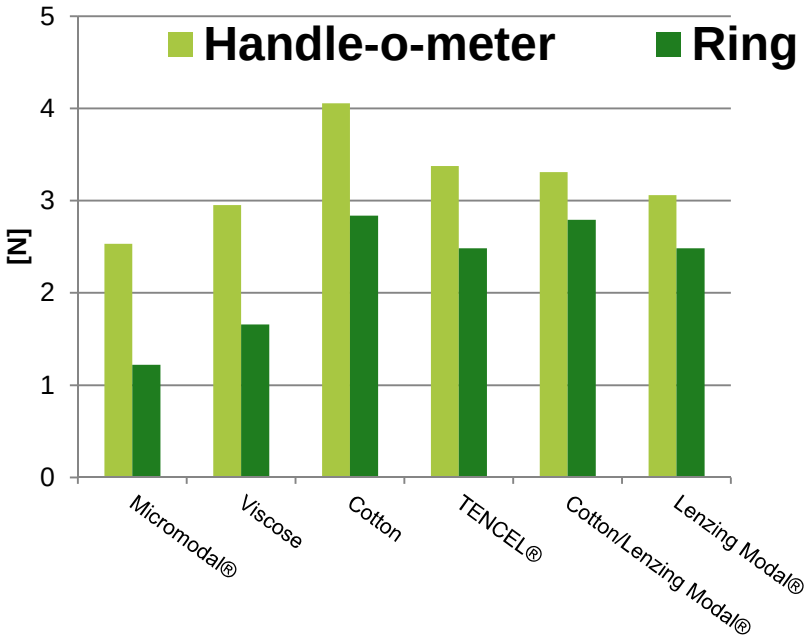




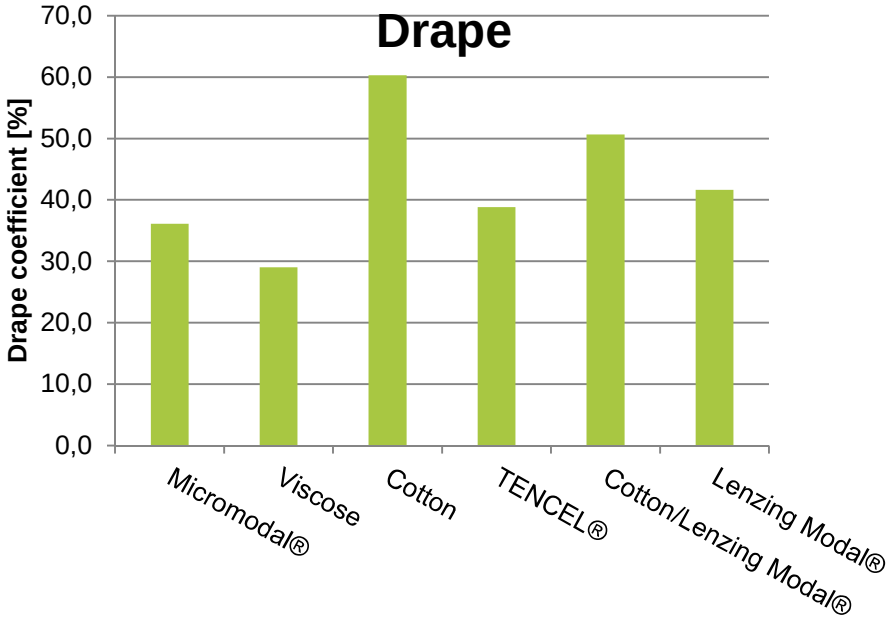
CO/CMD appears “softer” in TSA:
Reason: higher yarn twist =>
lower hairiness => lower noise

Sample preparation is essential

Drape, flexibility



Ranking depends on the physical process applied by the measurement method



Method comparison – Smoothness

	Best					Worst
Touché Panel	CMD µCMD	CLY CV		CO/CMD		CO
Non-expert 1	µCMD	CV	CMD	CLY	CO	CO/CMD
Non-expert 2	µCMD	CMD	CV	CLY	CO/CMD	CO
Non-expert 3	CMD	CV	µCMD	CLY	CO/CMD	CO
Non-expert 4	µCMD	CMD	CV	CLY	CO/CMD	CO
Non-expert 5	µCMD	CLY	CV	CMD	CO/CMD	CO
Handle-o-meter	µCMD	CMDCV		CLY CO/CMD		CO
Ring	µCMD	CV		CMDCLY		CO/CMD CO
TS750	µCMD	CLY	CM DC V		CO	CO/CMD
TSA HF	µCMD	CMDCLYCV			CO/CMD	CO
FTT	CMD µCMD	CLY		CV		CO/CMD CO

method comparison – Softness

	Best					Worst
Touché expert Panel	µCMD	CMD CLY CO/CMD		CV	CO	
Non-expert 1	µCMD	CV	CMD	CLY	CO	CO/CMD
Non-expert 2	µCMD	CMD	CV	CLY	CO/CMD	CO
Non-expert 3	CMD	CV	µCMD	CLY	CO/CMD	CO
Non-expert 4	µCMD	CMD	CV	CLY	CO/CMD	CO
Non-expert 5	µCMD	CLY	CV	CMD	CO/CMD	CO
Handle-o-meter	µCMD	CMD CLY CV			CO/CMD	CO
Ring	µCMD	CV		CMD CLY	CO/CMD CO	
TS7	µCMD	CO/CMD	CV	CLY CMD		CO
Drape	CV µCMD		CMD CLY		CO/CMD	CO
TSA Hand Feel (HF) calculated	µCMD	CMD CLY CV			CO/CMD	CO
FTT Total Hand (calculated)	µCMD CMD	CLY		CV	CO/CMD CO	

Example 3 – Knitted fabric

Non-expert 1	µCMD	CV	CMD	CO/CMD	CLY/CO	CLY	CO
Non-expert 2	µCMD	CMD	CV	CO/CMD	CLY/CO	CLY	CO
Non-expert 3	CO/CMD	µCMD	CLY/CO	CV	CMD	CLY	CO
Non-expert 4	µCMD	CMD	CV	CLY	CLY/CO	CO/CMD	CO
Non-expert 5	µCMD	CMD	CV	CLY/CO	CO/CMD	CLY	CO
Non-expert 6	µCMD	CV	CMD	CO/CMD	CLY	CLY/CO	CO
TS750	µCMD		CMD CV	CO/CMD	CLY CLY/CO		CO
TS7	µCMD		CMD CO/CMD	CV		CLY CLY/CO CO	
RING	µCMD CMD	CV			CLY CO/CMD CLY/CO		CO

Nm50/1, 130g/m²

Lenzing Modal® is permanently soft

- All hands and methods state: man-made cellulosics are softer then cotton
- Lenzing Modal® and Micromodal® are and the remain the softest

TSA makes softness talk

- Physical measurements are as different as hands
- TSA: Sound of softness
  - Practical
  - Fast
  - Reliable
- New Hand Feel (HF) value in development
  - Be part of it, send your fabrics collection

To keep in “touch”

Hear the softness!

Send your fabric collection!

Back up

TSA values

- **TS750** at <2000 Hz expresses „**felt smoothness/roughness**”, based on surface geometry/structure (creping/embossing, calendaring. Lower peak = smoother

- **TS7** at 5000 – 7000 Hz expresses **real softness** based on the stiffness of single fibers, fiber bending strength, internal structure, micro/macro compressibility, softeners and other chemical agents. Lower peak = softer.

- **D** expresses the fabric **stiffness**, measured as penetration depth into the fabric, expressed in [mm/N]. The result is based on fiber stiffness and fiber type (short/long fibers), internal structure, chemicals, thickness/density, fabric weight, calendaring. Lower D value = higher stiffness.

- **HF** is a combination parameter for the **hand feeling**, which is **calculated** on the basis of the TSA measured values above and the fabric weight and thickness. The calculation algorithm of HF was optimized for tissue samples and does not necessarily express textile properties.