Fabric Touch Tester (FTT) for assessment of fabric hand

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Introduction

Well-established *objective methods* (i.e. KES-F, SiroFAST, PhabrOmeter®, Handle-O-Meter, etc.) characterize the fabric hand indirectly by measuring mechanical parameters. *Panels of experts* (i.e. subjective methods) directly assess fabric tactile comfort properties (i.e. smoothness, softness, prickliness, etc.) and their results may be correlated with those of the objective methods. Complexity in handling and interpretation of the results, the high price and the high time-consumption are the main disadvantages of these objective and subjective methods.

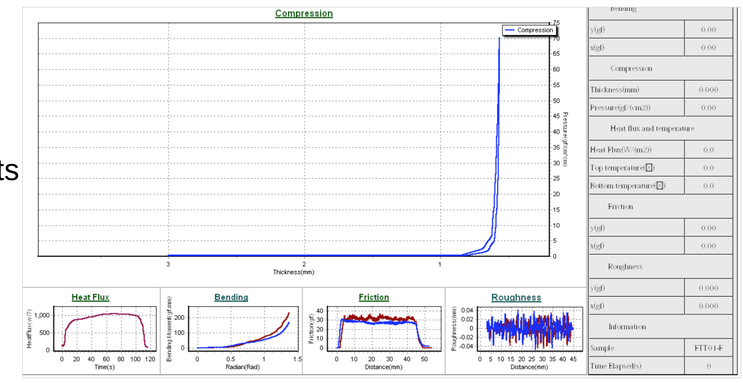
The Fabric Touch Tester (FTT) is a relatively *new instrument* that *simultaneously* measures *fabric physical properties* (i.e. bending, compression, friction, roughness and thermal properties) and predicts *some comfort indices* amongst which *softness, smoothness and warmth*.

Methodology and materials used in Touché project

- ❑ **Fabric Touch Tester (FTT) features**:
  - Simultaneous assessment of 13 indices: **bending** average rigidity & work, **compression** work/ recovery rate, rigidity and recovery rigidity, surface **friction** coefficient (fabric-metal), surface **roughness** amplitude and wavelength, **thickness**, **thermal** conductivity during compression and recovery
  - automatic computation of fabric comfort indices (i.e. smoothness, softness, warmth, total hand, total feel) for **active & passive evaluation** (measured respectively at outside and inside of fabric)
- ❑ **Expert panels for subjective assessment** of fabric attributes (i.e. softness, smoothness, flexibility, warmth, fluffiness): paired comparison by blindfolded expert panels and questionnaire (AATCC evaluation procedure 5) and correlations with results of FTT
- ❑ **Materials:** knitted or woven fabrics for (workwear and protective) clothing, terry fabrics, fleece, mattress ticking fabrics, automotive textiles, etc**.**
- ❑ **Statistical processing of the FTT and panels results:** means, standard deviations, boxplots, t-test, ANOVA, Pearson correlation FTT><panel results

Main results of Touché project

- ❑ **Modified FTT test protocol**
  - Enhanced number of specimens (i.e. 10+10 outside/inside fabric) for reliable statistical processing of results
  - Statistical processing of results in Python (Statsmodels package)
- ❑ **Set up test protocol for subjective assessment of fabric hand**
  - Set up a panels of ten experts and assessment methodology (i.e. paired comparison and questionnaires)
- ❑ **Company-specific cases: 12**
  - FTT analysis and expert panels to asses *the influence of a finish* (i.e. dye/ washing product/ care product/ FR treatment, etc.) on FTT fabric & comfort indices
  - *Influence of various production parameters* on FTT fabric and comfort indices
  - FTT analysis and expert panels to assess the *influence of fiber type* on fabric hand
  - Correlations of FTT results with other instruments (i.e. KES-F, Tissue Softness Analyzer (TSA).



Main advantages of FTT:

+ *all-in one instrument for rapid assessment* (max. 5 min) of 13 fabric parameters at *inside/outside of fabric* and *two fabric directions* (weft/warp, wales/course)

+ unlike expert panels *FTT is able to distinguish between samples with small differences* in treatment, fiber content, production settings

+ FTT is *a reliable alternative to classify an elevated number of samples,* in which case the subjective assessment will be time-consuming and unreliable

Possible limitation of FTT:

- Computed *FTT comfort indices:* are limited (i.e. smoothness, softness, warmth) and only suitable for fabrics that fall in the range used by SDL Atlas to set the statistical models (i.e. fabrics for clothing); warmth gives weakest correlations with the panels
- Fabrics: *FTT is less suitable for testing some specialty fabrics* (i.e. terry, coated fabrics, spacer fabrics, fabrics with variable pattern & holes, very thick or rigid fabrics)
- *Design FTT & handling:* correct positioning of the L-shape samples may be challenging for thin fabrics (i.e. rolled edges) and lead to time-consuming testing and risk on measurement errors and variations (STDEV)
- *Standardization:* no; standardization procedure to be initiated by FTT manufacturer SDL Atlas

Selected publications of Touché project

1. De Raeve, A., Vasile, S., Vanderhoeven, M., Cools, J., Louwagie, J., Malengier, B., Van Langenhove, L. *Characterization of factors influencing wear comfort of clothing*, 13th European Seminar on Personal Protective Equipment PPE Saariselkä (2016), poster
2, Vasile S, Malengier B, De Raeve A, Louwagie M, Vanderhoeven M, *Assessment of sensorial comfort of fabrics for protective clothing*, 7th ECPC conference (2016), Izmir Turkey, oral presentation
3. Binti Haji Musa, A., Malengier, B., Van Langenhove, L. *The reliability of the newly developed bending tester for the measurement of flexural rigidity of textile materials*, abstract accepted to AUTEX conference 2017
4. Vasile, S. Malengier, B., De Raeve, A, Binti Haji Musa, A., *FTT comfort indices of knitted fabrics with polyester-cotton ring-spun and air-jet yarns and post-treatments,* abstract accepted to AUTEX conference 2017
5, Binti Haji Musa, A., Malengier, B., Vasile, S. Van Langenhove, De Raeve, A., *Analysis and comparison of thickness and bending measurements from fabric touch tester (FTT) and standard methods*, accepted for publication to Autex Research Journal

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