INTERNATIONAL MAGAZINE ON TISSUE PAPER MACHINERY AND TECHNOLOGY

TissueMAG

tissuemag.com

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Dear Reader,

here is the first issue of TissueMAG, the new international magazine devoted to the technologies and services for the production and converting of Tissue Paper. The new magazine TissueMAG is distributed free of charge to paper mills producing tissue paper and converters of tissue paper located in various regions of the world. This issue is distributed in Europe, Middle East, North Africa and some bonus nations.

Therefore, May 2017 marks the foundation of TissueMAG that expects to double its issues in 2018: a first issue in May 2018 (postal distribution internationally) and a second issue in October 2018 (distributed during the MIAC exhibition in Lucca, which is held annually in Italy).

TissueMAG is not only a magazine but also a website **(www.tissuemag.com)** that amplifies the content distribution on a global scale. All operators in the tissue industry, wherever they are, from a PC, tablet or mobile phone, will be able to always access the same content of the magazine and a news and updating service on the tissue industry sector.

We wish you an interesting, fruitful and 'technological' reading!

Gianmaria Pfeiffer
info@tissuemag.com



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EDITOR-IN-CHIEF
Gianmaria Pfeiffer
e-mail: gianmaria.pfeiffer@edipap.com

EDITORIAL DIRECTOR
Mariella Nasi

STAFF EDITOR
Fabrizio Vallari

ADVERTISING
Laura Lupi
e-mail: sales@edipap.com

EDITORIAL ASSISTANT
Veronica Rizzi

LAYOUT & DESIGN
Stefania Giuliana
Francesca Acqualagna

WEBSITE
Francesco Tosi

PRINTER
Prontostampa Srl

EDITORIAL OFFICE

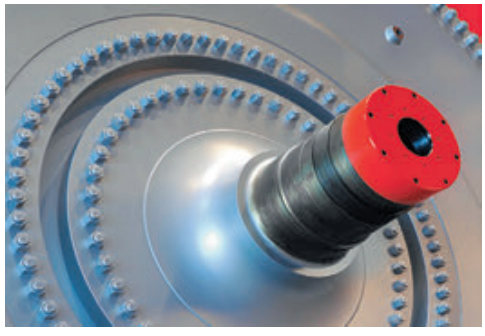
Edipap S.r.l.
Via Pordenone 13
20132 Milano - Italy
phone: +39 02 21711614
email: **info@edipap.com**
website: **www.edipap.com**

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emtec Innovative Testing Solutions

The TSA - Tissue Softness Analyzer

The industry standard for an objective testing of softness, roughness and smoothness

With an increasing wealth globally, customers more and more demand a tissue product with optimal characteristics for the respective application.

by: TissueMAG

Kitchen roll is supposed to absorb exactly the right amount of liquid and needs to have the right strength, hankies need to be smooth and toilet paper should be as soft as possible. Standard testing devices or measuring methods exist for the measurement of absorbency and strength as well as for the measurement of the overall feeling or touch of the material. Traditionally, human hand panels helped to measure the overall feeling. In the past years the emtec TSA - Tissue Softness Analyzer helped to shift the measurement of softness, roughness and stiffness - the parameters that determine the overall human feeling - on a much higher and objective level.

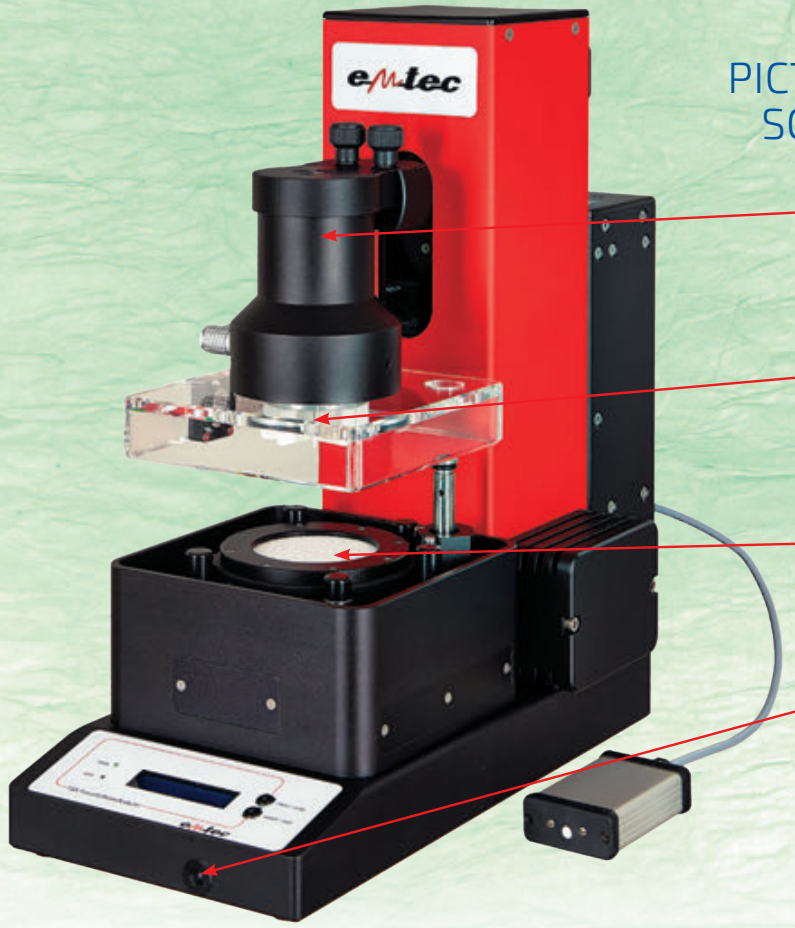
Measuring principle

The device measures the three basic parameters that determine our human hand feeling, the real softness, which comes from the fiber stiffness; the roughness, which



▲ On the left you see: FPA touch! Fiber Potential Analyzer. On the right you see: CAS touch! Charge Analyzing System.

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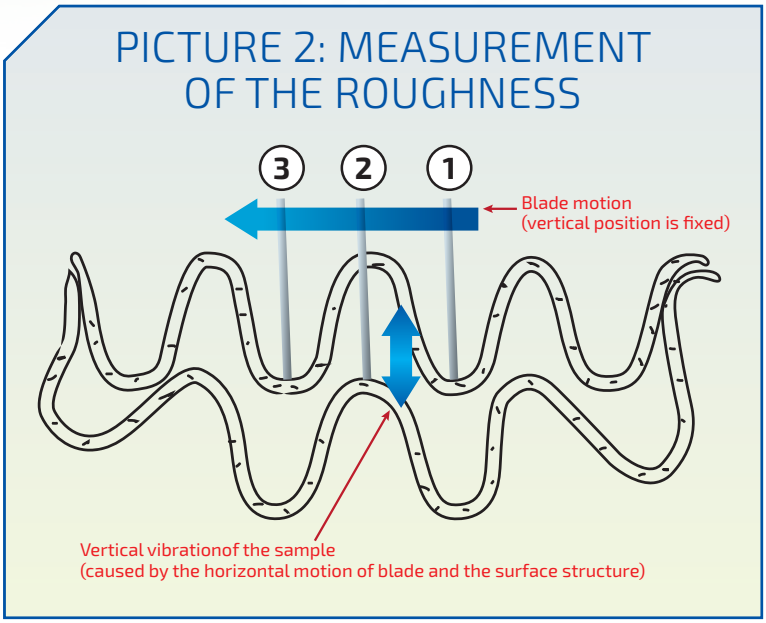


PICTURE 1: TSA - TEXTILE SOFTNESS ANALYZER

comes from the surface profile of the sample; and the stiffness, which is determined by the fiber behavior, the production technology and chemicals.
The TSA measurement is a two-step measurement. The first step is a sound analysis, where the real softness (TS7) and roughness (TS750) are measured. The second step is a deformation measurement, where stiffness (D), plasticity (P), elasticity (E) and the hysteresis (H) are measured. Calculated together, TS7, TS750, D, P, E, H etc. give the hand feel (HF) value (***Picture 1***).

First step – noise measurement

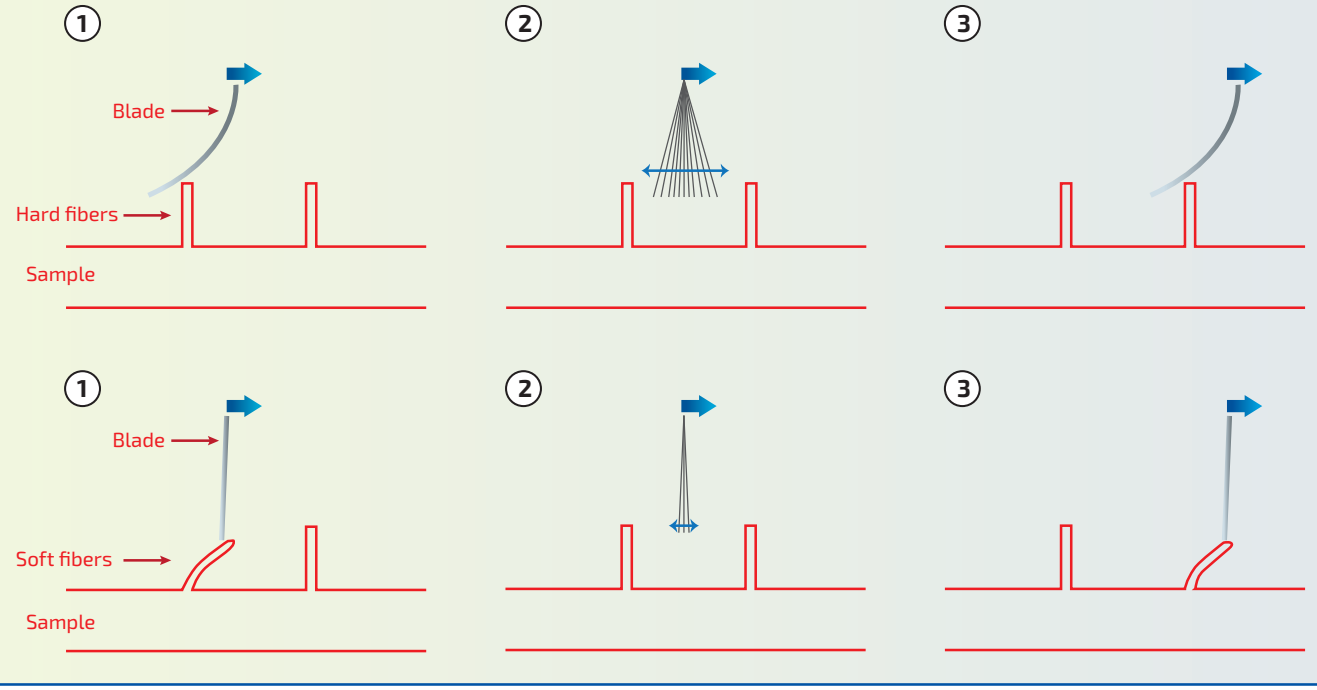
Once the measurement is started, the rotor with its eight blades is moving down to the sample and starts to rotate, the blades touch the sample while rotating. The rotation over the sample is usually done with a load of 100mN. By this rotation, two different types of vibrations are caused, (1) one is the vibration of the sample itself and (2) one is the vibration of the blades (***Picture 2***).



PICTURE 2: MEASUREMENT OF THE ROUGHNESS

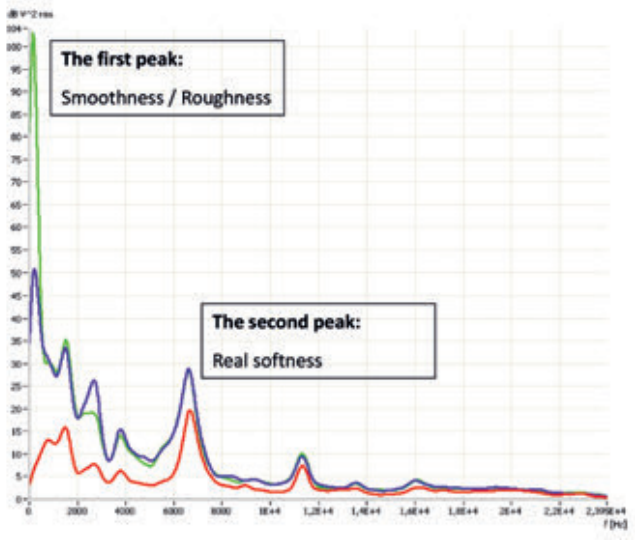
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PICTURE 3: MEASUREMENT OF THE SOFTNESS



> TSA - Tissue Softness Analyzer helps to shift the measurement of softness, roughness and stiffness

PICTURE 4: NOISE SPECTRUM



(1) The vibration of the sample

The rotor is fixed in vertical direction, but moves in horizontal direction over the sample. A 100mN load is applied on the sample. According to its surface profile, the sample itself gets into vibration. This vibration causes a noise, which is recorded by the microphone that is located underneath the sample.

The result can be seen in ***Picture 4***; the first peak in the noise spectrum represents the roughness.

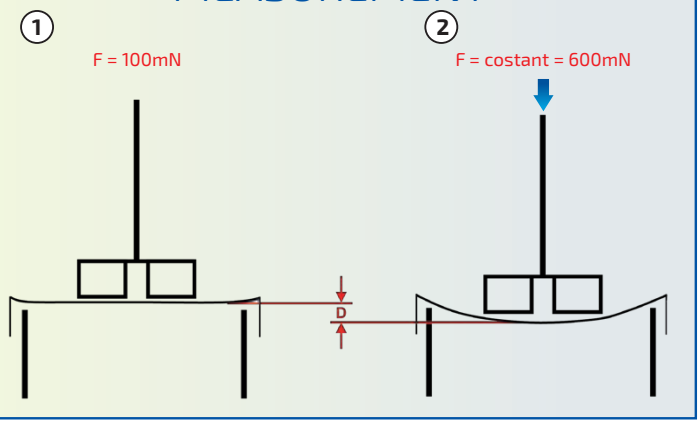
A higher peak means a louder noise, a louder noise means more vibration and more vibration means a rougher surface.

(2) The vibration of the blades

The blades move over the sample and the fibers that are sticking out of the material, again with a defined load of 100mN. If the fibers of the material are hard and stiff, it is also hard for the blade to move over these fibers and once the blade moved over the fiber, it will get into strong vibration (stick and slip principle). If the fibers are soft, it is easier for the blade to move over these fibers and thus the blade does not get into a vibration, which is as strong as if the fibers are hard and stiff. The vibrations of the blades cause a noise, which is recorded by the microphone underneath the sample. A stronger vibration causes a louder noise; a less strong

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PICTURE 5: DEFORMATION MEASUREMENT



vibration causes less noise. The result can be seen in ***Picture 4***; the second peak in the noise spectrum represents the real softness of the material. A lower peak means a softer material; a higher peak means a harder material. The higher the peak in the noise spectrum, the louder is the noise that is recorded.
A louder noise means more vibration and as ***Picture 3*** shows, a stronger vibration means harder fibers.

Second Step – deformation measurement

In the second step of the measurement, the deformation of the material is measured aswell as the elasticity, plasticity and the hysteresis. A load of 100mN to 600mN is applied to the sample and the deformation and other parameters, such as elasticity, plasticity and hysteresis are measured. The deformation is measured in mm/N, which means that a higher number indicates a more flexible material and the other way around.
The availability of these three basic parameters - roughness/ smoothness, real softness and stiffness/deformation - allows the use of the device in various application areas.
The manufacturing process can be optimized in several ways; an example is the chemical consumption (e.g. softener chemicals or lotion), another one, the setting of machine parameters or the optimization of the blade lifetime. Having the three basic parameters available that determine the human hand feeling is a great achievement. Never before, it has been possible to measure these three parameters individually. Of course humans are able to detect differences in real softness, roughness and stiffness, but only if the quality of the tested material is far away from each other - e.g. comparing a piece of sandpaper with a piece of silky material, extremely rough against extremely smooth. From the single parameters - real softness, roughness, stiffness etc. - a hand feel value can be calculated, which correlates very well with the human feeling. This is done by the help of different mathematical models/ algorithms. Product and/or region specific algorithms can be developed; this is necessary, because people from different regions of the world have a different expectation in terms of "good feeling". The different algorithms can take this into account.

Application examples

Adding softener in the tissue production/Application of lotion in the tissue converting.
Different methods are used in order to enhance the softness of tissue using chemicals:

- Adding softeners at the wet end;
- Applying softeners on the felt;
- Applying lotion.

In order to obtain good quality at any time and because an objective way to measure the impact of the softener or lotion was not available in the past, both is often overdosed. Of course, a hand panel can help to evaluate the quality of tissue material to a certain extent. However, to achieve results that can be used to quantify the quality of the tested material and to find out where processes can be optimized, huge efforts are necessary: cost are too high, too much manpower and too much time are necessary.
The solution: an objective testing device should be used, the TSA - Tissue Softness Analyzer.

Procedure

1. Measuring the softness of selected samples (tissue raw material) using the TSA, setting delivery specifications;
2. Determining the optimal amount of lotion to be applied using TSA measurements (carry out machine testing with increasing application quantity and use tissue of which the softness is on the lower limit of the agreed specification);
3. Choosing the softener with the best cost-performance ratio;
4. Incoming control of the raw material.

This is just one of many examples, how the TSA can be used to reach several targets at the same time. The example above shows, how the device can be used to optimize the dosage of softener chemicals in the production or of lotion in the converting.
The device can be used from the beginning of the production process (defining the right fiber mix, long/short fibers, virgin/ recycled fibers etc.) until the final product (quality control), it delivers objective data; the measurements are repeatable and reliable. No subjectivity disturbs a reliable measurement of the tissue quality anymore. ●

emtec Electronic GmbH
Gorkistrasse 31 04347 Leipzig - Germany
phone: +49 341 245709-84
website: www.emtec-electronic.de
contact person: Alexander Grüner - **email:** a.gruener@emtec-electronic.de

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