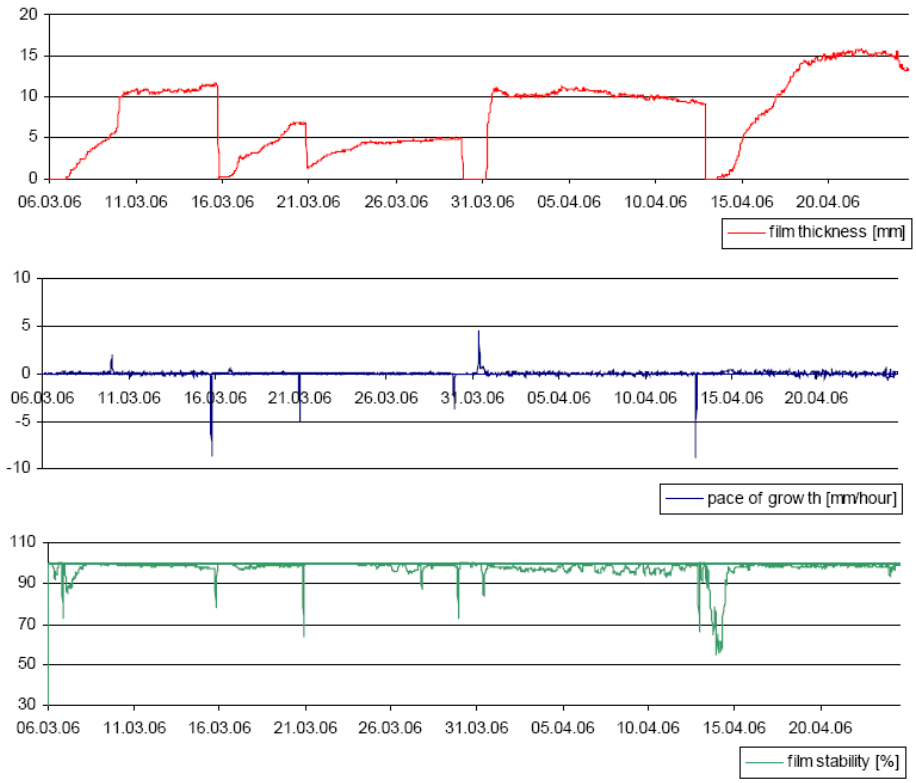
Two New and Exciting Measuring Devices for Quality Assurance, R&D, Product and Process Optimization in Paper Production and for Chemistry Suppliers

Deposit Control System – DCS

The first online measuring instrument developed by Emtec in cooperation with the company Ashland is the Deposit Control System DCS – a measuring device for the evaluation of organic or anorganic deposits in paper machines, for example biological fouling deposits. This unit can be installed in different places of the papermaking process as a bypass to pipes and containers in shower water or white water or as a real online sensor directly in pipes and containers.
It can record the thickness, growing speed and stability of deposits to optimize the dosage of biozides, to stabilize the process and to save money.



Multifunctional Measuring System Tissue Softness Analyzer – TSA

A new objective measuring method and multifunctional testing instrument for the determination of the tissue softness and other tissue quality parameters

Basics: "What is tissue softness?"

Before we talk about softness measurement we have to answer to the question: **What is softness?**

There is no clear physical definition of the quality parameter "softness", but softness is a mixture of different single quality parameters of tissue.
This makes it very complicate to find a softness number.

Softness is a basic parameter for tissue products and textiles.

Usually, softness is determined by a human panel, consisting of a representative selection of people, very often comparing the sample to be tested with reference samples.
Each member of a panel has his own idea of softness.
Additional these panels are usually customer-specific, but also area-specific.
Therefore even an average of all members of the panel is not really an expression of the softness of a panel, if we look for small differences. Of course big differences can be determined without any problems.

The panel represents more or less the specific demand on quality of the consumer in the respective area.

The subjective sensation of tissue softness basically depends on:

- surface softness:
  - smoothness
  - fibre stiffness
  - micro-compressibility
- bulk softness
  - stiffness
  - cushionness
  - creasability
  - macro-compressibility
- and other characteristics like:
  - color
  - odor
  - heat conductivity
  - embossing

From these parameters (in various weighting), based on the specific sensitivity of the finger tops, nose, ears and eyes, each human brain determines a softness, based on an individual "biological equation". The weighting of the parameters depends very much on the individual person and therefore on the selection of the members of a panel and on their country and region of origin.

Among others one big disadvantage of the panel test method is, that it is extremely time consuming and therefore very expensive, and it is only reliable, if it is maintained with very high effort. For the use in quality assurance and product optimization it is not applicable.

New method and analyzer for softness measurement

The target was to develop a new method, which can gather the most important parameters, which affect the softness, with one instrument, if possible in one run, and combine it with the help of specific equations to a softness number. After many long sleepless nights the idea was born to measure the softness in the manner we present today as a new method: fast and easy to handle, via software adaptable to the requirements of the customers, accurate and reproducible and proofed in thousands of tests.

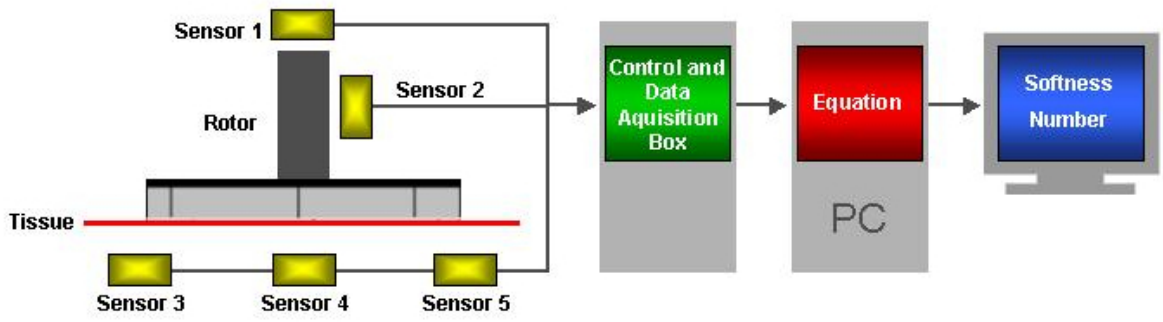
The basic idea of the new testing method is to try to simulate the human fingers as much as possible.

The instrument “TSA Tissue Softness Analyzer”, based on this method, measures the most important parameters, which affect the softness, like surface smoothness, plastic / visco-elastic and elastic deformation, in one run and automatically calculates softness numbers from a combination of these parameters, using specific equations.

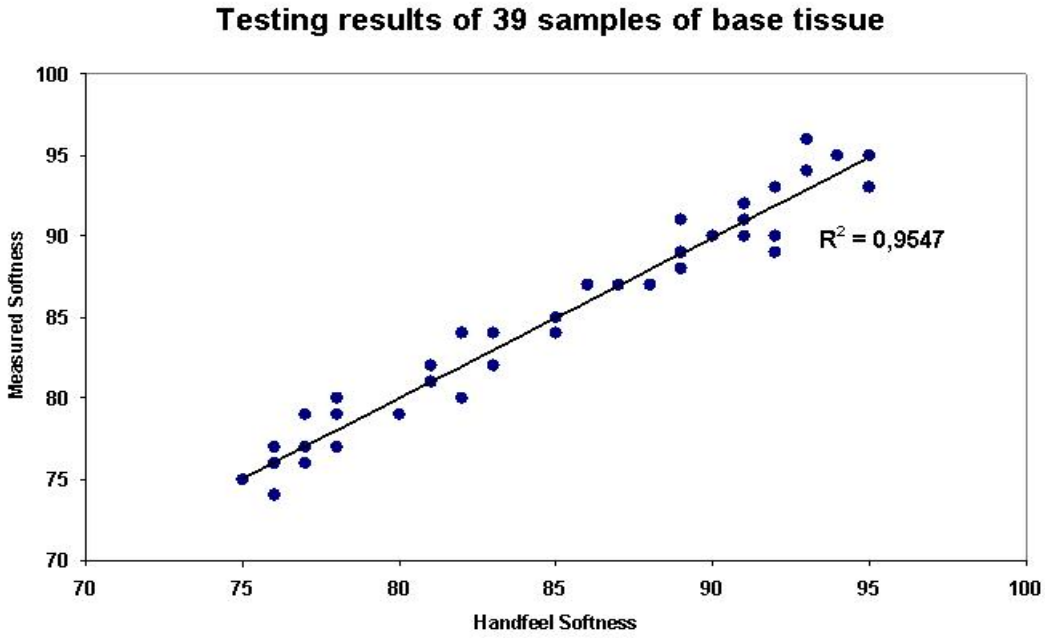
Measuring principle

Measuring softness with the new method works as follows:
The central elements for the measurement are the rotor, the vibration sensor and a few other sensors to gather additional data and to control the functions of the device. For measuring, the rotor is pressed on the tissue sample. When the rotor reached the final position, it starts to rotate. The interaction between the rotor and the tissue sample excites vibrations on the tissue sample. The vibration sensor receives these vibrations and relays them to the analysis unit. The analysis unit sends the prepared data to the computer. The computer will process the data by means of a complex evaluation. The softness is calculated using a complex equation by means of further simultaneously measured parameters respectively parameters which were entered by the customer beforehand (in total it is possible to use up to 68 different parameters).

Measuring principle (schematic)



The correlation between softness, subjectively determined by a specific human panel, and the results, measured with the TSA, is very good, because of the applied measuring principle and because the numbers are calculated by using equations which realize an adaptation of the measured results to the desired human panel.



Multifunctional Measuring System "TSA Tissue Softness Analyzer" based on the new method

The main use of the new method is the measurement of the

- **Softness**

of tissue. Additionally, it is possible to measure

- **Elastic/Viscoelastic/Plastic properties**
- **Berst resistance**
- **Compressibility**
- **"Crumple ability"**
- **Basis weight**
- **Thickness**

using different available accessories.

Tissue producers, chemical suppliers, manufacturers of tissue machines and creping blades, purchasing agents of large supermarket chains as well as institutes and universities need to measure the softness.

The main use of the device is quality assurance during production of base tissue as well as product development and optimization. By the help of an objective method it is possible to minimize the use of material decisively and lower the costs.

In addition, you can compare finished products of **one** producer as well as finished products of **different** producers:

- facial tissue
- handkerchiefs
- bathroom tissue
- kitchen roll
- others (even cosmetic pads)

Another interesting use is the measurement of laboratory sheets, which have been produced by a sheet former. You can, for instance, control the intake of pulp, test the influence of chemicals on the softness or optimize the formulation of fiber suspension with the help of the instrument outside of the tissue machine.

4. Application Methods

We recommend to make the introduction of the device in a mill in **three steps**:

1. **Comparison of base tissue or un-embossed finished products of the same grade for quality assurance in tissue production and for product optimization (chemicals, lotion, blade, pulp, machine parameters), also for comparison of hand sheets**

2. **Benchmarking of base tissue and unembossed finished products**

3. **Benchmarking test of embossed finished products (needs a data base from the customer for developing an equation by emtec to calculate a softness number)**

Examples to show the correlation between hand feel test and TSA numbers