CHARACTERIZING ABSORPTION IN NON-WOVENS

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Abstract

A new technique exists for characterizing absorption in cotton or almost any non-woven material. This absorption-characterizing instrument, named the MK GATS, allows the user to quantify the absorption of a raw material in a repeatable, strait forward manner.

Introduction

The technique behind quantifying absorption is based on a Johnson and Johnson patent that was licensed to MK Systems. The GATS instrument was originally developed in the 1970's for rapid absorption products, such as thin tissues. In 1998, the instrument was re-designed with a to become a Windows based system. In the last two years, new features created at North Carolina State University brought the GATS instrument fiber-orientation features.

Discussion

Most absorption instruments cannot distinguish between capillary forces or gravitational forces; rather, cumulative absorption data is attained. The MK GATS, on the other hand, offers perhaps a more meaningful and discriminating approach.

Consider for example analyzing the absorption of several different cottons. Each sample is placed on a test plate test plate, which is connected directly to the water reservoir. The water level in the reservoir drops as the cotton drains it during the test. The GATS lowers the test plate as the reservoir height drops, to offset any height differential between the reservoir and the test plate.

Note too that the reservoir has been placed on a balance that is connected to a Windows based computer. The computer closely monitors the rate of absorption and amount of absorption in 0.1-second intervals. Raw curves and data are provided for quick results. Data is compiled by the GATS in grams of H2O per gram of Cotton over time. The excel-compatible curves reveal differences between several cottons in a short period of time (figure 1).

Tampons have also been analyzed by the GATS. Clear differences between name brand materials were obtained quickly and easily (figure 2). The same tests can also be run on paper towels, or almost any paper or non-woven product.

Work done at North Carolina State University (College of Textiles) under Dr. Benham Pourdehimi brought the GATS more powerful features. Dr. Pourdehimi's work involved implementing a camera that grabs images as the material wets. The camera, placed in a bird's eye view over the tissue, monitors the wetting through the sample and grabs images every 0.1-second. Consider monitoring absorption in a sample of highly oriented tissue, with an MD/CD ratio greater than 2. The water wets and expands through the sample in a manner that corresponds with the fiber orientation. Highly oriented sheets of tissue reveal oval-like expansion. Samples with no orientation wet in circular fashion. These images are downloaded to the computer and analyzed. The shape of the curve reveals the fiber orientation in the sample (figure 3).

Summary

Monitoring absorption in the GATS appears to be an effective, time saving system. For further question, please contact MK Systems at (978) 774 1880.

References

Pourdehimi, Benham, North Carolina State University College of Textiles, (919) 515 1822 MD/CD = Machine Direction / Cross direction of fibers.

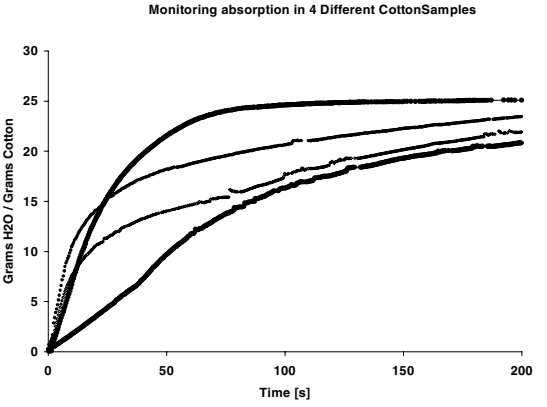

Figure 1. Determining absorption in 4 different cotton samples.

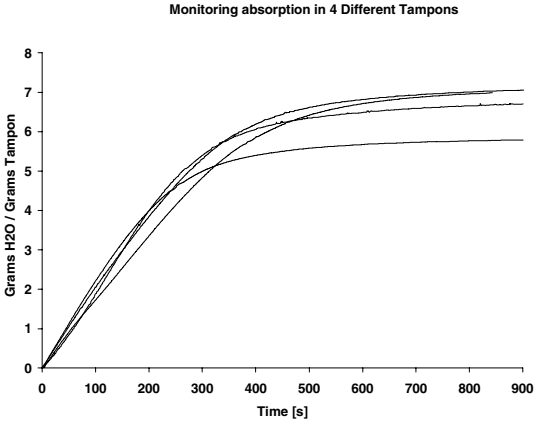

Figure 2. Determining absorption of 4 feminine hygiene products.

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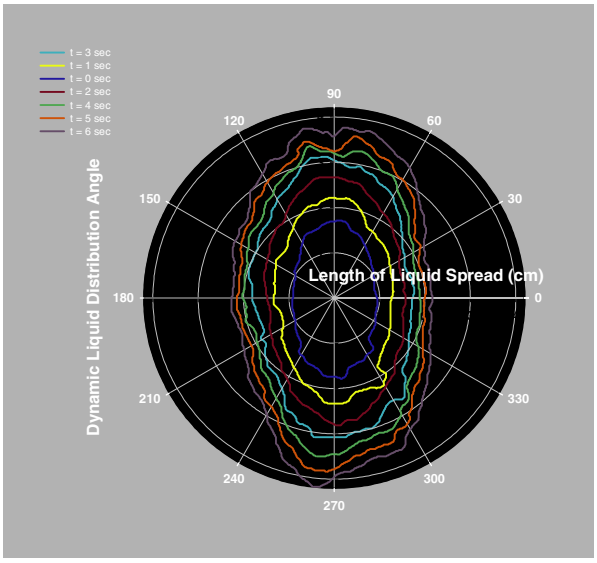

Figure 3. Images taken during the of wetting of an oriented tissue.