Fraunhofer

ITWM

1

MASC-VQC
HOMOGENEITY OF NON-WOVENS

What is VQC?

One of the most important properties of fleece is its mechanical firmness, which is to a high degree correlated to fleece homogeneity. VQC determines the fleece homogeneity quantitatively by methods of image processing, thus allowing conclusions about the fleece firmness.

Product properties

- 100 % automatic control of the fleece homogeneity ("cloudiness") at high belt velocity

- calibration in order to compensate inhomogeneous lighting

- robustness with respect to disturbances, such as displacement of the image section or variations of lighting

- integration into the production process

- easy adaptation of the configuration, e. g., with respect to the desired resolution and inspection severity

- generation of test statistics, e. g., for the determination and analysis of trends

- evaluation protocols in order to guarantee production quality

- user-friendly interface

Applications

- hygienic sector (e. g., diapers)

- medicine (e. g., bandage materials)

- filters (e. g., in the automobile sector)

- textile industry (e. g., technical textiles, padded garments)
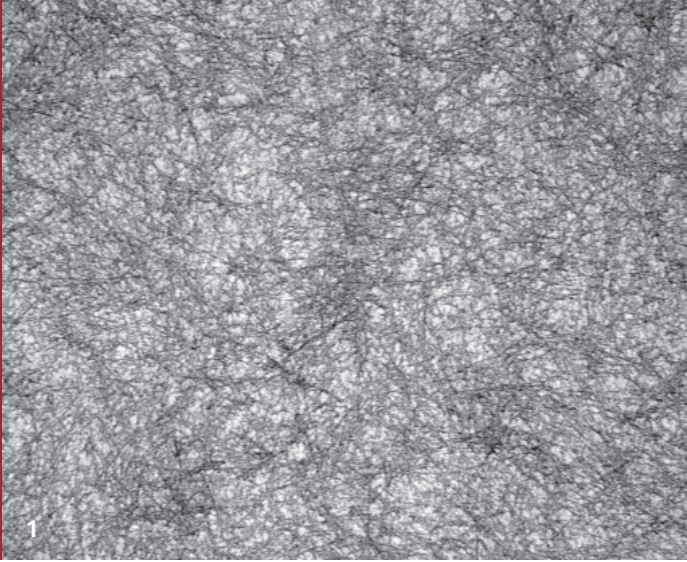
- agriculture (e. g., field coverings)

Fraunhofer-Institut für Techno- und Wirtschaftsmathematik ITWM

Fraunhofer-Platz 1
67663 Kaiserslautern
Germany

Contact
Dipl.-Math. Mark Maasland MTD
Phone +49 631 31600-4445
mark.maasland@itwm.fraunhofer.de

www.itwm.fraunhofer.de/bv

1

2

*Laboratory determination
of fleece quality*

1 *Inhomogeneous fleece
with some fiber defects and
agglomerations*

2 *Relatively homo-
geneous fleece*

Fleece firmness

Fleeces are subject to increasing quality requirements. One of the most important proper-
ties is the mechanical firmness, where an essential criterion is the uniform fiber distributi-
on, which is disturbed by inhomogeneities such as fiber agglomerations and fiber defects.
During fleece production, the homogeneity is used as an indirect indicator for the rating
of the fleece firmness. At a very high resolution scale – if the fleece is observed from a very
small distance –, the individual fibers of which the fleece consists are still visible; the fleece
seems inhomogeneous. At rough scales – observing from a far distance –, the fleece appears
very homogeneous if it does not show extremely distinctive defects. Thus, the fleece "ho-
mogeneity" refers to several scales.

Defect detection

Apart from its firmness, the surface quality of the fleece is also an important criterion for
the fleece quality. At the Fraunhofer ITWM, the systems MASC-SPOT and MASC-TASQ
have been developed for defect detection within the product series MASC. The modular
structure of these systems allows a simple combination of several products, resulting in a
complete quality control.

Software tool for homogeneity rating

The Fraunhofer ITWM has succeeded in developing an algorithm for a qualitative and
quantitative rating of fleece homogeneity. The software tool VQC allows the secure and
robust evaluation of fleece homogeneity (the so-called "cloudiness") by methods of
image processing. It can be applied to laboratory examinations, as well as for the online
determination of product quality during the production process.

Image processing

The original image is subjected to a multiscale analysis according to the Laplace pyramid,
a method which suggests itself since fleece homogeneity is a multiscale phenomenon by
nature. As a measure of homogeneity, the variance of the images is computed on each
scale. The variances of the individual scales are added up to a homo-geneity index in a
weighted sum. The scale gradations can be customized, enabling the user to adapt the
system easily to very different types of fabrics.