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Research area: Product aims

End products made of paper, paperboard and board // Other

Key words:

Softness, tissue, handkerchiefs, toilet paper

TITLE:**Objective assessment of softness of tissue papers and possibility to obtain given softness specifications****Background/Problem area**

Besides dry and wet strength as well as water absorption capacity, softness belongs to the most important properties of tissue papers. This particularly applies to handkerchief paper, toilet paper, napkins and kitchen towels. Due to the lack of objective measuring procedures this property is in spite of its importance still assessed in so-called panel-tests which are performed by groups of experts in an entirely subjective way. In addition to their subjectivity these panel tests are extremely time consuming and do not allow a clear distinction between papers from different manufacturers. So far there are a number of measuring techniques available which are based on mechanical, acoustic or optical phenomena. Those give some information about the surface characteristics of these papers but unfortunately they are in no way able to simulate the human perception of softness.

Objectives/Research results

Therefore the intended project aims at developing a cost-effective, objective, repeatable and fast measuring procedure which gives information about the softness of a tissue paper with a very close correlation with the human perception.

Based on a great number of metrological and haptic investigations, a standard panel test was elaborated and a measuring procedure was identified which enable reproducible softness evaluations of tissue paper handkerchiefs.

The procedure was prepared for standardization and presented to the DIN Technical Committee NA 074-02-05 AA "Test methods for tissue paper and tissue products".

Moreover, a complex softness evaluation procedure was developed that uses different measuring methods, is related to the conventional haptic evaluation method for tissue paper and provides satisfactory estimates of the target parameter product softness. The following parameters were found to have a significant influence and incorporated in a neuronal model to mathematically estimate the softness of tissue products: tensile strength, tensile energy absorption (TEA), elastic modulus (via the bending stiffness determined by the cantilever method), roughness (GFM Mikro CAD method), unevenness (optical method), FOGRA contact area as well as measurements of the Tissue Softness Analyzer.

The suitability of the Emtec Tissue Softness Analyzer for the softness evaluation of paper handkerchiefs could be proved by extensive investigations. The device - which has only recently been available on the market - uses a complex system of mechanical and vibratory/dynamic stresses to reproducibly measure and evaluate tissue materials, covering most of the measured values found to be relevant in the project.

The data and measurements obtained in the project were systematically evaluated to investigate selected effects of production and converting influences on softness. Among other, the results have shown that full-area printing leads to softness losses in handkerchiefs.

Application/Economic benefits

The project results will enable tissue producers, traders and users to comparably evaluate tissue products by means of a standard procedure. The project has led to a panel test procedure for softness evaluation that includes subjective criteria, as well as to two objective measuring methods that take into account various physical properties found to be significant for the softness of tissue materials.

It could be demonstrated that the panel test procedure and metrological evaluation methods provide comparable evaluation results for the softness of tissue paper handkerchiefs, meaning that all these methods are equally suitable and applicable for softness evaluation.

The participating research institutes have gained enough experience from the project work to offer independent tissue material evaluations as a service to the industry. The developed panel test procedure can be proposed for standardization.

The Tissue Softness Analyzer is a complex device suitable for evaluating the softness of tissue materials – it provides reproducible results and can readily be used in the industry.

The identified influences of major production and converting factors on softness can be used by manufacturers and converters to systematically develop haptically attractive products.

Period of time: 01.09.2009 – 29.02.2012

Remarks

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