

Research institute:

PTS Heidenau
Pirnaer Straße 37
01809 Heidenau

Head of the research institute:

Dr. A.-B. Kerkhoff

Project leader:

Dipl.-Ing. Petra Behnsen
Tel: 03529 / 551-685
Fax: 03529 / 551-899
E-Mail: petra.behnsen@ptspaper.de

Internet: www.ptspaper.de

Research area: General aims

End products made of paper // Other

Key words:

NIR spectroscopy, paper quality

Title:

Developing a grade-specific modular measuring system to determine and optimise parameters relevant to process and product quality

Background/Problem

Cost-optimal and interruption-free manufacturing processes leading to consistently high product quality are the general aim of paper producers. Some mills have already implemented online monitoring systems for quality parameters such as grammage, moisture, thickness, formation or pinholes in the paper, followed by the subsequent testing of physical parameters in the finished product. Some smaller mills only tend to measure physical parameters like strength characteristics, gloss or smoothness to a limited extent. Paper constituents are not quantified. This can be attributed to the following factors:

- the expensive technical facilities required for sample preparation and chemical analyses,
- the vast analytical know-how required to handle the great variety and complexity of methods,
- exorbitant equipment and personnel costs,
- lengthy and time-consuming procedures.

Since this is unacceptable to most mills, there is a great demand for a fast and comprehensive method to quantitatively assess the constituents of paper as the basis for process, product and cost optimisation.

Research objective/Research results

The research project aims at developing a universally applicable measuring device for important paper constituents relevant to product and process quality, e.g. papermaking raw materials (fibres, fillers), additives (sizing agents, AKD) and special coating materials. The project objectives include the following steps:

- The technical configuration of the NIR spectrometer was defined. The spectral range from approx. 1321 nm to 2316 nm has proved to be the best possible for a diode array spectrometer for the planned development task.
- The measuring sequence for careful and practical examination of paper as the product to be measured was defined.
- The qualitative and quantitative NIR modules were developed and validated at least once. Additional models were set up and tested in addition to the scheduled NIR models.
- The transfer of the NIR models to different diode array spectrometers was concluded successfully.
- A user interface for the *Paperanalyzer* was developed and tested for the meaningful coordination of the hardware and the qualitative and quantitative NIR models.

Application/Economic benefits

The *Paperanalyzer* which was developed is not currently available in state-of-the-art technology. Its first intended use is for graphic papers (wood-free/wood-containing, coated/uncoated), which constitute one of the main markets of German paper producers, accounting for 11m tonnes in 2007. The revenues attainable in this product segment depend significantly on raw material and production costs. A cost factor analysis showed that pulps and other papermaking raw materials accounted for around 30 % of the total cost. This makes quite clear that papermakers must endeavour to utilise their resources to the optimum in order to be able to offer their products at competitive prices.

Easy and especially fast analyses of paper constituents using the *Paperanalyzer* will enable paper producers to comprehensively control the quality of their products. For the first time ever, they will be able to easily monitor and keep track of important and expensive raw materials or additives in paper. This will not only help them to enhance their product quality, but also to reach other important aims such as reducing raw material consumption (sizing agents, for example) or improving the manufacturing process.

Project period: 1.1.2007 - 30.6.2009

Remarks

The research project IW 070088 was funded by the German Federal Ministry of Economics and Technology (BMWi).