Quantitative In-line NIR measurements of papers

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For NIR measurements of papers normally diffuse reflectance accessories are used which can provide a large sampling area. The in-line process control FT-NIR spectrometer MATRIX-E enables the contactless measurement of paper samples of low silicone coat weights on label-stocks in a paper converting factory.

For this study concentrations of silicone between 0 and 2 g/m^2 on various paper substrates were included in a quantitative method. The aim was to achieve an absolute value for the deviation from the target value of 1 g/m^2 during continuous movement of the paper with velocities around 400 m/minute.

Influences from the uncoated paper type due to supplier, color, opacity, area densities, pre-coating as well as different compounds of the agent silicone were investigated and it was found that all these papers can be represented in one PLS-model. Especially the fact that silicone as an element is present in clay coated papers is of no consequence to the measurements with MATRIX-E. Moreover during in-line installations the variation of the moisture contents in the moving paper due to variable machine velocities as well as the reflecting material of the cylinder have to be considered. It is shown that the result of the in-line calibration has the same prediction ability compared to lab scale results(Root Mean Square Error of Cross-Validation RMSECV = 0.034 g/m^2).