Abstract
Hyperspectral near infrared image analysis of a phenol formaldehyde adhesive curing process

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Introduction

High quality coated abrasives or sandpaper are commonly used in different types of industry. In the manufacturing process the abrasive material is attached to a backing material, typically paper, by a variety of adhesive compounds. The adhesive used in this study is phenol formaldehyde. The curing process of the adhesive consumes a lot of energy due to a high heating demand. This study focuses on the possibility to shorten the curing time, or/and to reduce the temperature during the curing, as an environmental sustainable development of this industry process. The structure and quality of the adhesive layer was studied with hyperspectral near infrared (NIR) imaging with main focus on degree of curing. Image data in 239 wavelengths was collected for 12 to 18 curing times.

Discussion

The curing process was found to stabilise after 5 hours of curing for the series cured at the lowest temperatures and after 4.5 hours for the highest temperatures. Simulated on-line PLS regression models were used to predict degree of curing in the real-time process with an *RMSEP* of 0.5 hours. Controlled monitoring of the curing degree would improve the energy efficiency of the process, and shorten production time. This application has a high potential of becoming an industry standard.