

Novel Process Control for the Resin and Panel Industries Based on FT- NIR

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The present study overviews the progress made by Chimar Hellas on the NIR-based control of aminoplastics production and application processes. Methodologies, based on FT-Near Infrared (NIR) spectroscopy are presented. These methodologies were developed for raw material and final product evaluation as well as in-situ monitoring of formaldehyde-based resin synthesis.

The control of the manufacturing process in formaldehyde-based resins is critical in defining the quality and reproducibility of the product. However, the majority of resin industries follow empirical procedures and have no access to systematic and automated methodologies for process control.

In the field of wood adhesives, NIR methodologies have already been developed for the **on- and off-line** characterization of aminoplastic resin systems at laboratory and industrial scales. More specifically, NIR methods have been developed for the quantitative determination of urea and UFC solutions as well as in-situ monitoring of formaldehyde-based resin synthesis, which were proven particularly useful, especially in applications where the reproducibility of production was difficult to assess. The usability of laminating paper produced by impregnation with formaldehyde-based resins has also been determined with NIR chemometrics in a semiquantitative manner. In addition, NIR has been used for the prediction of the volatile content in laminating papers.

The time evolution of characteristic bands in the NIR frequency range has been employed for the **on-line** investigation of the reaction stages and several indices have been developed providing a means for monitoring directly the effects of changes in resin formulation and allow for correcting actions.

The above-mentioned methodologies are patented by CHIMAR HELLAS S.A. and are marketed under the trade name GNOSSI™ (General Non-destructive On-line Spectroscopic Interpretation). They have successfully been applied in the industrial production of urea–formaldehyde pre-condensate, the production of formaldehyde based-resins, the analysis of impregnated paper prior to the lamination and the prediction of the volatiles content of paper impregnating lines. The purpose of this paper is to present recent advances of industrial relevance concerning the NIR applications in the wood resin industry.