

Inline Determination of Formaldehyde Emission from Sawdust of Wood-based Material during Production

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For manufacturers of wood-based materials it is desirable to have available a measuring method for determining formaldehyde emission which allows to continuously monitor compliance of limit values, on the one hand, and to have measured values available for process optimisation, on the other. For that purpose, it is inevitable to move formaldehyde measuring out of the laboratory onto the production line, i.e., to implement at least one atline measuring.

The objective was formulated out of this initial situation to develop an approach and a procedure that allow formaldehyde measurements to

be carried out fast enough in order to facilitate process control. At the same time, the measuring results were expected to be sufficiently verifiable to initially establish correlations with the help of the derived methods and, beyond that, by applying the test chamber method. The latter results in the claim to measure formaldehyde directly and to use no procedures which, in their turn, are based on correlations, such as the NIR spectroscopy.

The IHD and the company GreCon were working jointly on that issue. An idea was developed to measure emissions from chips obtained from newly pressed panel material. Here, sampling the chips from the exhaust of the diagonal saw or of the edge trimming device is a favourable idea. This procedure allows to measure a representative portion of chips from the middle and surface layers. The formaldehyde analyser made by Medizin- and Labortechnik Engineering GmbH (MLE) was used for formaldehyde determination. The device performs the acetyl-acetone method automated by means of the injection flow method.

Based on preliminary investigations, GreCon developed a measuring apparatus working in cycles. It includes all components to determine formaldehyde emissions. Three sampling plates are moved in a circle and cyclically run through the stages of material feeding, the measuring chamber and disposal. The successful testing of the measuring apparatus was followed by tests on a laboratory and then industrial scale.

The results at hand are based on industry-scale tests, whereas chipboards of various qualities, i.e., of varying formaldehyde emission levels and of varying thicknesses, were involved. Figure 2 shows a compilation of formaldehyde emission values of



Fig. 1: Apparatus for determining formaldehyde emissions from wood-based chips

chipboards of various qualities. These values represent average values of their respective test series of one product each. The products of E1 quality varied, among other things, across a wide range of thicknesses, which contributes to the spreading of the results. Products of CARB II or F**** quality demonstrate, according to the definition, a lower emission level than E1 products. The results show that the three different qualities E1, CARB II and F**** are well distinguishable. The lowest formaldehyde emission from chips found, i.e., 0.4 ppm, ranged clearly above the blind value level of < 0.02 ppm. Figure 3 shows formaldehyde emissions from chips contrasted to those from the chipboard. Here, too, the entire range of products accordingly observed was included in the respective presentation. As a result of the development effort, there is a measuring apparatus for determining the formaldehyde emission from wood-based chips, which, as

part of a future overall concept is envisaged to be used in inline monitoring and which supplies information on the course of the process to be used as a basis for optimisation tasks. The results of the practical tests show the fitness of the measuring apparatus to work under industrial conditions. Formaldehyde emissions from chips of chipboards of lower emission levels can also be measured and differentiated. It was shown that correlations can be established between the formaldehyde emission from chips and formaldehyde contents or emissions from relevant wood-based panels as regards products or plant facilities.

Further works consist in automating sampling, the development of an industry-scale version of the formaldehyde analyser and the electronic link-in of the apparatus. In a further step, it shall be incorporated into a production process.

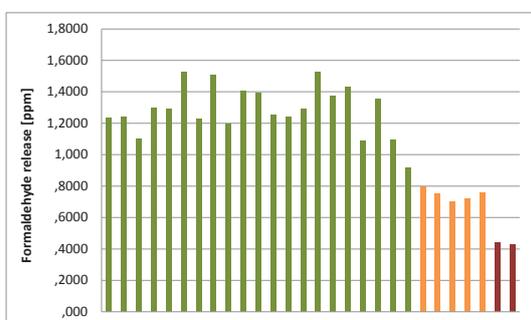


Fig. 2: Formaldehyde emission (mean values) from chips, chipboards of different qualities and thicknesses; Green: E1 quality; Orange: CARB II quality, Red: F**** quality

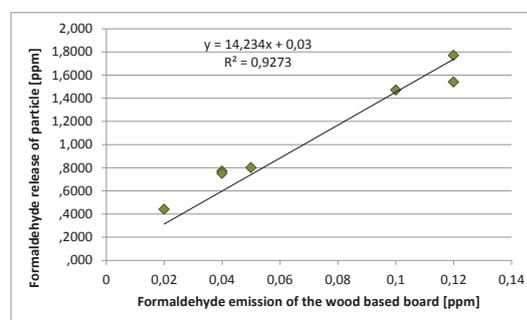


Fig. 3: Comparison of formaldehyde emissions from chips to formaldehyde emissions from the wood-based board (ASTM D 6007), chipboards of different qualities and thicknesses