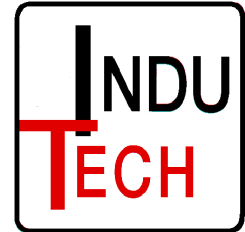


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# Application Note

## Sappi / Gratkorn / Austria

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### Moisture Determination of wood chips without nuclear isotopes using the on-line microwave moisture meter PMD-2450

*The paper and cellulose factory SAPPi Gratkorn belongs to the international active SAPPi group with factories in South Africa, North America and Europe. SAPPi is one of the world leaders in the production of fine paper with an overall capacity of 5 million tons paper per year and 3 million tons cellulose per year. Alone in Gratkorn 820,000 tons paper and 235,000 tons cellulose (dry basis) are produced each year with the world's largest paper machine PM 11.*

For several years SAPPi Gratkorn have an infrared moisture meter installed on the conveyor belt from the stockpile of wood chips to the digester of the cellulose factory. Wood chips consisting of hard and soft wood are transported on this conveyor belt. The two types of wood are loaded successively onto the conveyor belt, so that both types lie in layers on the conveyor.



With the infrared reflection method only the moisture of one of the two components can be measured. Furthermore larger deviations are caused by changes of weather (sun / rain). Under these conditions the surface moisture is not representative for the total moisture of the wood chips. A further disadvantage of the infrared method is the strong reduction of the measured values for frozen wood chips. Therefore the measuring signal of the IR equipment could only be used with restrictions to control the digesters. Therefore a calculated value was used, which resulted from a preset value, the lab value of the previous day and the reading of the IR-meter.

The goal of the digester control is to optimize the addition of water depending on the moisture of the wood chips and to minimize the consumption of chemicals.

The infrared equipment should therefore be replaced by a moisture meter, which measures a larger and more representative amount of material resulting in a better accuracy and more reliable readings. The microwave transmission method was selected as the entire material layer is irradiated. Therefore hard- and softwood are measured simultaneously. Because the microwave method not only detects the surface moisture but also the moisture inside the chips, the influence of the weather becomes insignificant. However, as both methods register free water only, no considerable improvement was expected for frozen wood chips.

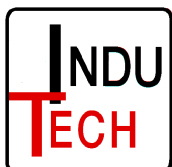
The PMD 2450 of the company Indutech was installed in the second half of 2001. The equipment operates according to the microwave transmission method measuring attenuation and phase shift. Varying layer thicknesses are compensated by the output signal of an existing belt weigher. As such no nuclear compensation of the load on the conveyor belt is required, therefore there is no need for a radioactive source.

A representative sampling of the hard- and softwood mixture proved to be impossible. Therefore the moisture content of the mixture was calculated from the mixing ratio and the moisture content of two separate samples of the hard- and softwood. However, errors are caused by variation of location and time and must be considered during evaluation of the results.

The obtained accuracies lie within the range of 1% to 1.5% moisture.

The readings of the microwave moisture meter PMD 2450 correlated well with the infrared equipment during short measuring periods. However, as expected, over longer periods the microwave meter proved to be more stable, especially in changing weather conditions. During the winter period the following interesting observation was made: the IR device showed a measuring error of up to 10% moisture caused by the frozen wood chips. Under similar conditions the microwave equipment indicated only 1.5% too little moisture. The equipment works reliably. The PC software for visualization, calibration and data archiving is user friendly. SAPPI Gratkorn plans to install additional devices in the future.

Helmut Eder from the engineering team and Bernd Nauta from the cellulose factory of SAPPI Gratkorn were assigned to the realization of the project. Both can be contacted via telephone number +43 3124 201 0.



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