

Detection and Evaluation of periodical thickness variations in cold rolling mills to determine and remove the cause for the variations

Good strip thickness control modes are able – when high accuracy gauges and effective servohydraulic screw down are installed - to achieve thickness tolerances within $\pm 5 \mu\text{m}$. But short periodical variations which result from oscillations and vibrations in the mill itself cannot be controlled by an AGC.

For this it is necessary to measure extremely fast with shortest measurement point distances, and then make a special evaluation to detect the periodical situation in the strip, allowing the conclusion, for example, which roll in the mill has an eccentricity error. The mill user will then be able to remove the cause for the strip tolerance problem.

The detection and evaluation consists of 3 parts:

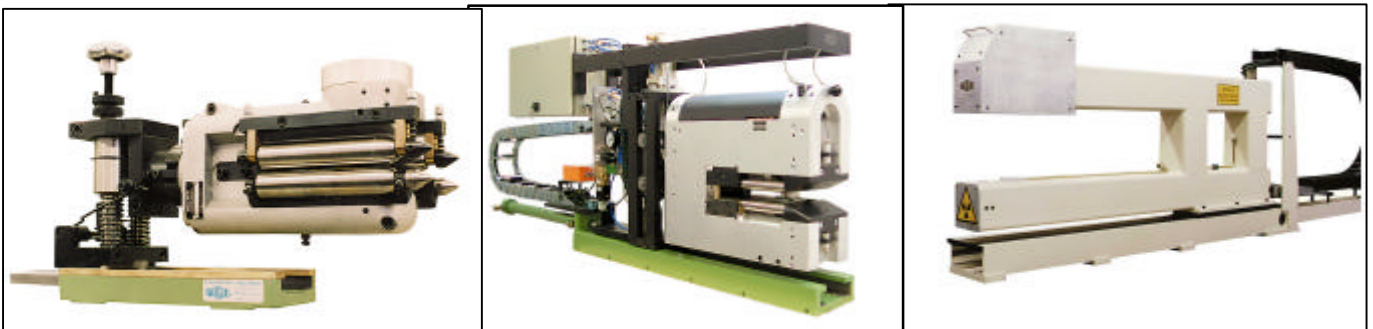
1. Measurement

The strip data (thickness, width, material), the mounting situation and the strip speed determine which thickness gauge is necessary. Here, for example, three of several possible types: two contact gauges and a high speed x-ray gauge.

VBM 1063

VBM 1076

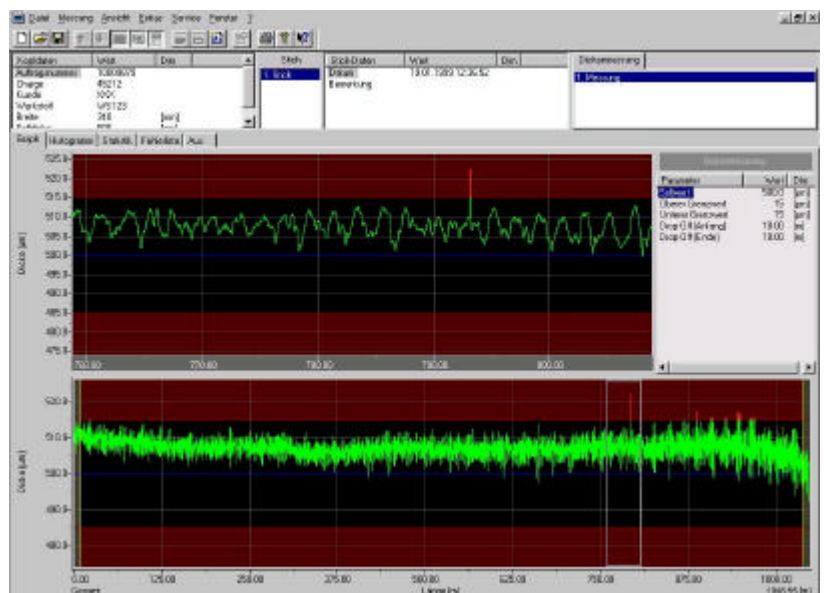
Gamma X



2. Measurement data collection

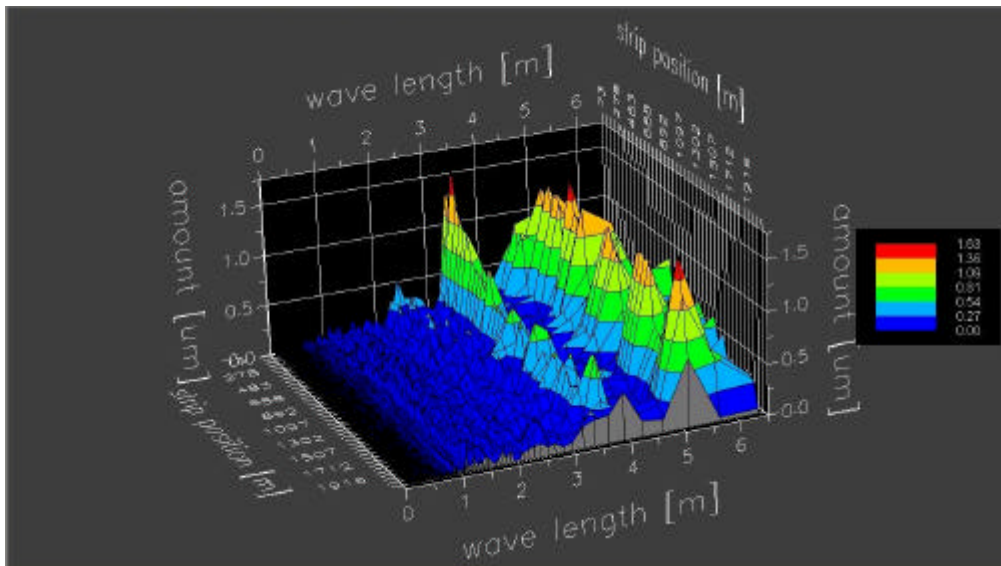
The thickness gauges deliver the measurement points in a high frequency, continuously and with highest precision. The data collection must be able to store each single measurement point, e.g. every 1 ms.

In addition, such an on-line data collection allows a lot of statistical evaluation and reports which is helpful for the end customers of the coils.

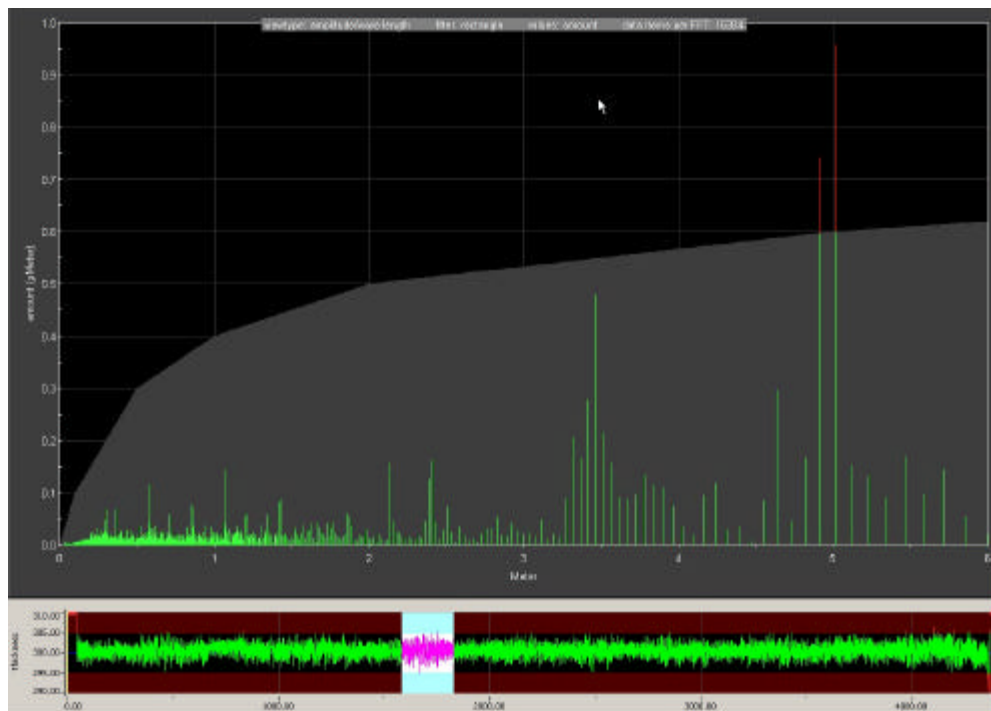


3. Fast Fourier Analysis (FFT)

The final determination of the periodical variations is done by an FFT analysis.



The thickness variations are displayed in such a clear arrangement that, on the one hand, the cause for the variations is easy to determine and, on the other hand, the tolerance situation in the coil is recognized in one view.



Effect

The better the gauges which are installed in the cold rolling mill, the better the result of the AGC. Moreover, tolerance problems which are caused by the mill itself can be detected by the FFT analysis.