Board surface measurement

Summary

Thanks to the use of this measurement type the company's cement bonded particleboard production quality has definitely improved and the production costs for non-matching boards (wasters) have been saved. Another advantage is the way of introducing the system; it does not influence the production directly, but by means of production engineers who will evaluate the necessity of intervening in the production line control.

The system can also be used for other production types where flat surface is required. These are e.g. glass industry, rubber or metallurgical industry, or production of other construction materials.

The catalogue sheet contains only some parameters important for your decision. For planning always require a corresponding user manual and eventually a technical consultation on the possibilities of use.

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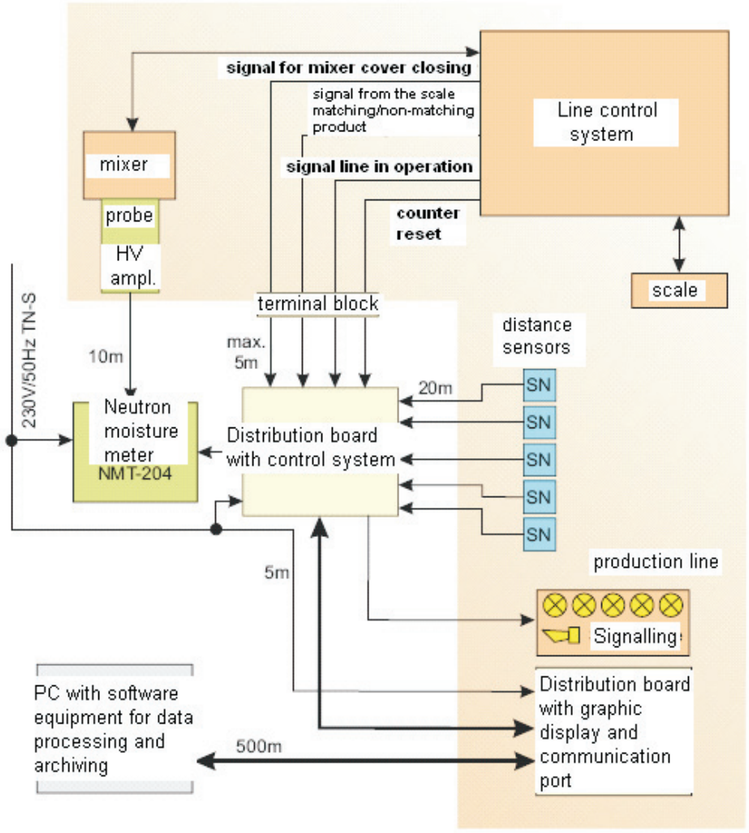
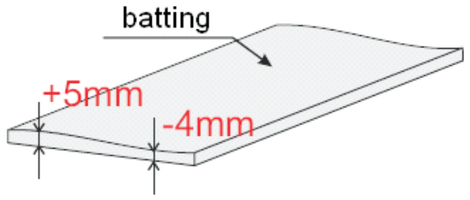
To ensure cement bonded particleboard production quality, we have developped a special measuring system for flat surface measurements of the boards in collaboration with the production engineer. The boards are prepared by scattering the material (so-called batting) on the metal plate using a coating machine. The properly adjusted machine will spread the material evenly over the whole surface area of the metal sheet.

The quality of spreading from the machine can vary depending on the physical properties of the material. This will show itself in the flatness of the applied material. Until recently, a visual flatness check was made and then the machine was adjusted. Unfortunately, a visual check was not sufficient for improving the quality of the boards.





After replacing the visual control with digital scanning of the board surface it was necessary to analyze all modes and production conditions. This analysis was used as a basis for the research for introducing suitable measuring elements and developing custom software for flatness calculations.

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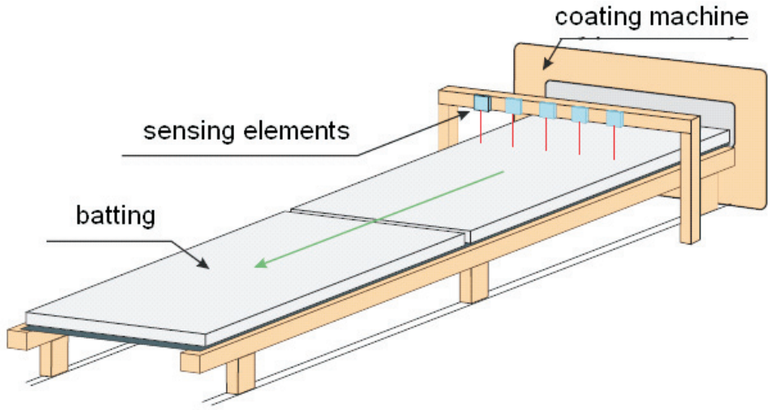
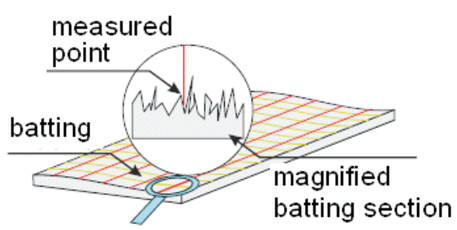
Description of the system

The measuring system is comprised of five measuring elements for exact distance measurings, a neutron moisture sensor, metal sheet position sensors, a control system, a display, a transfer path and PC software. See the block diagram.

The distance measuring sensors are located close behind the coating machine above the batting. They are connected to the distribution board with the control a system by a special interference immune cable. Signals from the moisture meter and from the metal sheet position sensors are also led to the control system. Command signals referring to line condition are given from the control system of the line. The data from the control system is transferred to the display in the control centre and to the PC.



The distance sensors are designed for measuring the distance from the batting with an accuracy of 0.1 mm. To reach this accuracy it was necessary to perform repeated measurement tests with different sensor types. The conditions were made more difficult by the uneven surface of the batting as shown in the detail picture, by the feed speed and by different distances according to the board type. Pursuant to these tests a suitable sensor type was selected and it was applied for long-term use so that its function was verified and pertinent measurement failures or errors prevented.

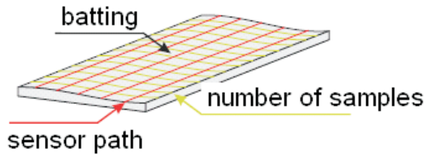


Measuring method

When the line is started, data reading from the distance sensors begins. The so-called measuring points, whose number depends on the data reading speed of the control system, are created. The board speed influences the size of the point gap in rows (green stripes), which can be adjusted by the control system software. Automatic regulation of time gaps between the samples depending on the board feed speed was not required and does not influence the result of the measurement.

A table of samples is created in the control system. Samples on one board in the longitudinal direction are averaged and in this case five values originate. These are compared and evaluated considering their variation from the average value.

These values, including their evaluation, are saved in the exported database along with the board product number, material moisture and temperature data and the sequence number of the mixed material from the mixer. The current data is displayed at the control centre. If any of the measured board flatness parameters exceeds the limit, the displayed value will light and acoustic alarm will start.



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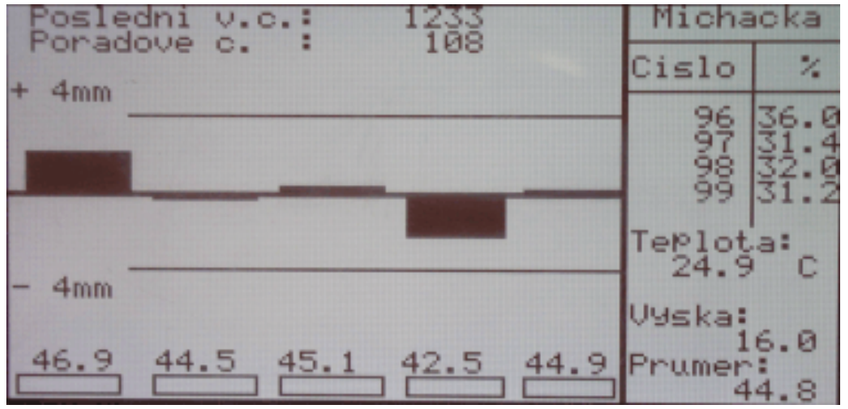


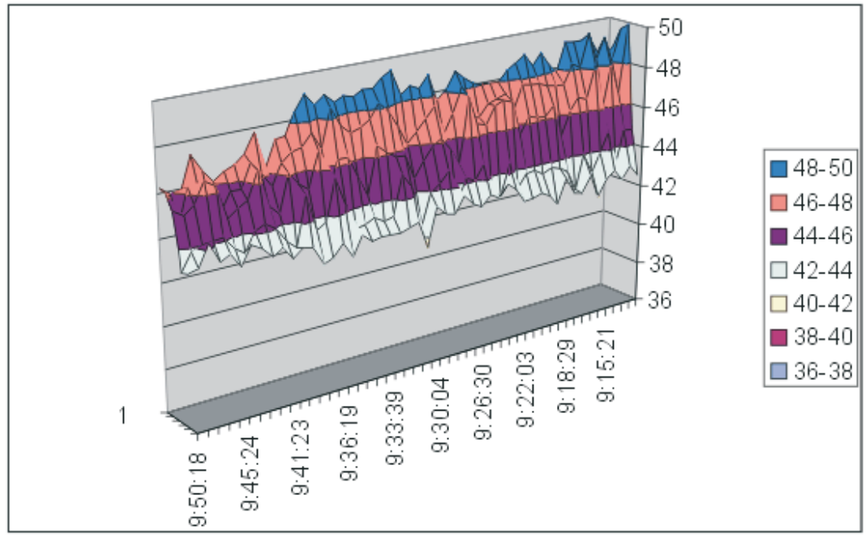
Posledni v.c. = last prod. No.
Poradove c. = seq. No.
Michacka = mixer
Cislo = number

Teplota = temperature
Vyska = height
Prumer = average

Measurement results

The measurement output is a total data table containing the board production number along with the measured values, production date and production time. This table is read from the control system at regular intervals and stored in the PC by means of the “DESKY” software. Here the data are archived and ordered according to the board and service requirements. The PC software is able to send the final data through the computer network to the individual service workers. The data can be further processed, e.g. in Excel, and various graphs can be created. The example below shows the curve change at machine adjusting.

The result of machine adjusting was visible as well. The coated boards are stacked. At 9:15 the system was put into operation. It was found out that the batting is sloping 5 mm towards one end of the metal sheet. When the boards were stacked there was a visible deviation and the boards inclined to one side. The measuring system announced this fault and the relevant service worker started to adjust the machine. At 9:41 the deviation was already within the allowed tolerance and the boards had stopped inclining to one side. They were even with the ground.



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