

Traversing area weight gauge
MASS-SCAN X ME with the
advanced MultiEnergy X-ray
Technology developed by EWS

THE RIGHT MEASURING TECHNOLOGY FOR SPECIAL TASKS IN PARTICLEBOARD PRODUCTION

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Electronic Wood Systems (EWS) in Germany offers a complete range of quality inspection systems for wood-based panel manufacturing. In fact, after the introduction of the new flagship device EcoScan NEO for mat inspection (area weight gauging and foreign body detection) and its installations in several plants, the company has gained good practical experience with the performance in MDF and OSB forming lines. This marked a substantial progress in the field of X-ray measuring technology for wood-based panel production.

ACHIEVING PERFECTION

For particleboard production, EWS equips the forming line with a modern X-ray measuring technology and is able to customise it for the individual requirements. This is reflected in the first installation of the new Siempelkamp production lines where the customer was able to optimise the process and quality.

A particleboard is made of three layers with individual forming heads. What achievement it would be to have the individual area weight distribution of each layer? If the final panel shows a density

distribution in need of improvement, wouldn't it be exceptional to identify the responsible forming head in the line?

Nevertheless, the top and bottom surface layers are typically less than 20 per cent each of the total panel, and consist of fine particles. For instance, the first layer on the forming belt may be thin, which is challenging for both mat forming and measurement. The homogeneity of the top and bottom layers is indispensable for high panel surface quality in order to achieve the perfect quality in surface coating. Considering all

layers, the advanced panel manufacturer is interested in both the mean area weight for basic material dosing and distribution (across and lengthwise). And it is here that mat forming aims at a fundamentally homogenous distribution. In addition, the dedicated cross-profiles are realised, for example, with edge overmetering, to counteract the lateral mat expansion during hot-pressing. The final panel properties are then subsequently made in the forming line to a considerable extent.

WHY MASS-SCAN X ME?

The tolerances for panel thickness and density distribution are already low while the customer requirements will increase in the future. Such narrow production tolerances will require high precision of the applied measuring systems. Addressing this, EWS provides an innovative X-ray system for high-precision area weight measurement in the forming line. The central components of the gauges are

a low-power X-ray unit with a sensitive detector traversing across the mat. This moveable configuration enables periodic zero calibration next to the line in order to compensate any influences on the X-ray signal. To note, this would not be feasible in the case of a static X-ray unit.

The traversing area weight gauge of MASS-SCAN X ME provides a consistent high measuring resolution (up to +/- 0.5 per cent mat weight) along a wide production range. This performance is achieved using the advanced MultiEnergy X-ray Technology developed by EWS. Here, the X-ray energy is automatically adapted to the amount of material to be measured. This is an automated function of the EWS X-ray systems where no operator action is required. The measuring results are then displayed on the visualisation screen as a cross profile with focus on the mat edges and as a longitudinal trend of the average mat weight.

For special tasks in particleboard production, three devices of the MASS-SCAN X ME are installed in the forming line after the individual forming heads. The first X-ray gauge measures only the bottom layer. Due to the low layer thickness (low area weight), a considerably low energy is applied to obtain an appropriate measuring contrast and precision of the displayed results. The second device follows after the core layer formers and the third is installed after the pre-press to measure the total mat. The units travel synchronised across the particle mat such that the respective mat segments are equivalently scanned by all three systems. All measuring data is evaluated in coordination so as to display the area weight distribution of all three layers individually. The special visualisation shows the resulting cross-profiles per layer as relative distribution and absolute mat weight. Reliable measuring results are ensured by the comprehensive pre-configuration during manufacturing and the individual fine-tuning during start-up of the X-ray devices.

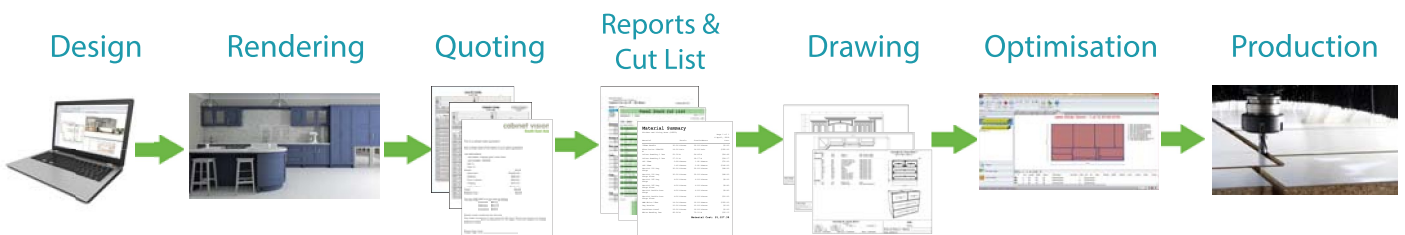


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ALL IN ONE

This configuration of three MASS-SCAN X ME is part of Siempelkamp's SicoFormer and provides actual values for particle mat forming automation. Like all SicoScan measuring systems, it is well-integrated into the plant control system, which will be common standard in fully-automated wood-based panel production plants and requires minimum operator interaction. Beyond new production lines, the system is superb for upgrade of existing lines, thanks to the low space requirements.

In addition to area weight gauging, the moisture content measurement of the particles is required at numerous positions in the process, such as after drying, before/after resin blending, and finally on the forming belt.

The panel manufacturer just needs a simple and affordable device with reliable measuring results that is easy to maintain. Here, the infrared moisture



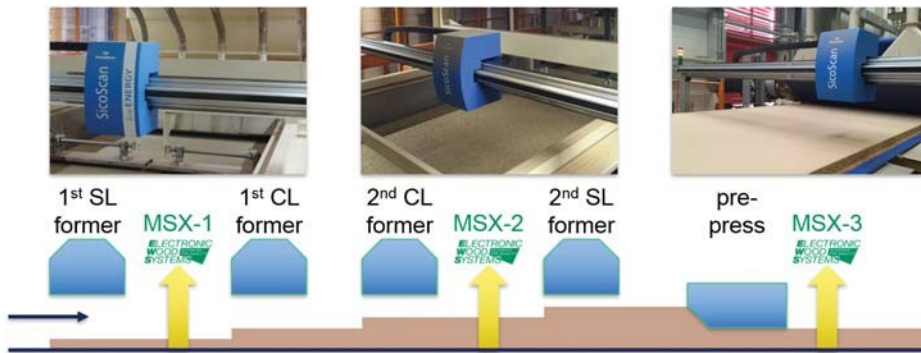
Moisture content measurement with the non-contact infrared device MT-SCAN for versatile applications in the particleboard production process

gauge MT-SCAN is considered to be a one system for versatile applications. The non-contact device can be installed over the mat after every forming head or it can also measure through a window looking into a material bin or a drop chute (with material collection unit). For extreme environmental conditions, it comes with a protection housing. This flexibility enables the production manager to

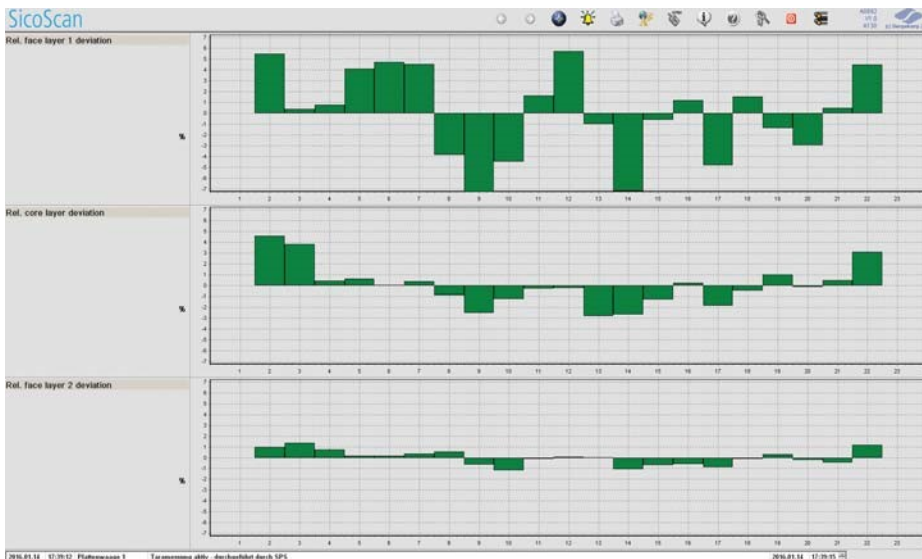
install several MT-SCANS at all relevant positions for individual observation and control of the moisture content considering both the fine surface (top and bottom) and coarser core layer particles as well as before and after resin blending.

Besides the measuring systems in the forming line, particleboard manufacturing also needs inline quality inspection of the final panels after the press. Here, blows (poor internal bond), thickness, panel weight and the density distribution are the relevant properties to be observed and controlled. To this end, the EWS systems BLOW-SCAN, THICK-SCAN, and CONTI-SCALE X ME are standard in modern production lines and available to upgrade existing plants. The CONTI-SCALE X ME features again the MultiEnergy X-ray Technology for consistent high measuring precision along the production range. This non-contact X-ray panel scale requires a considerably reduced space for installation in the conveyor as compared to the huge mechanical panel scales.

Furthermore, the CONTI-SCALE X ME is capable in measuring thin panels at high production speed, where the massive mechanical scales are considered to fail. Finally, only individual measurements facilitate to explicitly control the corresponding process steps. Such task-oriented inline measuring and control systems are a key factor for Industry 4.0 in the wood-based panel production. The application of reliable measuring systems facilitates to obtain savings in material and energy and to maintain high panel quality. ©



Special measuring equipment for particleboard manufacturing: Three X-ray area weight gauges MASS-SCAN X ME in the forming line for individual layer measurement and optimisation



SicoFormer visualisation screen for the triple X-ray area weight gauging system with individual cross-profiles of the bottom surface, core, and top surface layer