UPU 3000

Online Bond Quality Measurement with the Ultrasonic Camera

GreCon®

Measure the Bond Quality with the GreCon Ultrasonic Camera

Exploit all reserves of your production, homogenise your process, increase the availability of your equipment and increase your profit.

Unused reserves lead to increased costs; blisters to unsatisfied customers and lost profits.

The GreCon Ultrasonic Camera UPU 3000 is the optimum measuring system to produce high-quality wood based panels at optimised expense by evaluating the bond quality. The internal board quality can be controlled thanks to the integrated blow detection system.

Automatic Calibration

Basically, the quality of the measuring results depends on constant conditions during measurement. Because this cannot be permanently ensured under industrial conditions, the GreCon Ultrasonic Camera is equipped with an automatic calibration and dirt accumulation control. After the first calibration of the measurement transducers to a reference value, the system is automatically checked for accumulated dirt at pre-determined intervals. If an inspection channel deviates from the adjusted reference value due to this accumulation, the system automatically re-calibrates. If signal degradation reaches a specified value, the next maintenance interval is indicated to the operator.

ct-Frame

To achieve a continuous system availability, the UPU 3000 is equipped with a ct-frame. This basic construction of the measuring system makes an installation after saws or in continuous productions possible.

The system can be calibrated at any time by moving the ct-frames sideways out of the production line. Maintenance, diagnostics and repairs can be carried out during the running production.

Furthermore, the mobile construction of the system allows an escape run in case of big blisters and thus prevents the measuring system from being damaged.

Operational Reliability

Thanks to the automatic calibration, an integrated self-diagnostic system and the construction of the system with a ct-frame, a high availability and operational reliability and, above all, a constant measuring quality is ensured. This again leads to high confidence in and acceptance of the system by the operator. The integrated automatic calibration ensures that the represented information is a reliable basis to regulate and optimise production processes. With the reference values for the measurement transducers remaining constant, it is possible to go beyond a simple yes/no statement and to determine the bond quality with an ultrasonic system.

Bond Quality

The signal detected by the ultrasonic receivers is influenced by changes in important process parameters, such as press factors or material moisture. These process parameters directly influence the bond quality of a panel.

The degree of glue cure and the number of glue bridges are a measure of ultrasound absorption.

The higher the number of glue bridges and the higher the degree of glue cure, the lower the absorption of the ultrasound by the panel. The more plastic the glue bridges and the fewer in number, the higher the absorption of the ultrasound. With its ability to correlate these differences, the Ultrasonic Camera UPU 3000 can represent the true bond quality from the received ultrasound signal.

Besides measuring the bond quality to optimise the production process, the UPU 3000 presents an integrated blow detection for final quality control and classification of the measured panels. If blows occur, their size and location is clearly represented. The defective panels are marked, and a signal is given to allow them to be identified for rejection.

Construction of the System

Up to 22 inspection channels can be mounted on a frame, which is made out of patented aluminium profiles. The cable and compressed air ducts are integrated in the profile and thus protected against surroundings.

Ceramic transmitters, which are installed below the material to be measured, create the necessary ultrasonic energy. The emitted ultrasonic pulse is directed to the receivers through the panel by means of a reflection mirror, also installed below the material. This patented arrangement of vertically installed ultrasound beam hole and inclined reflection mirror has the advantage that falling dust or chips are diverted so as to avoid choking the transmitter units.

The receivers, installed above the material, can tilt backwards or forwards. Thanks to this hinged mechanism, the receivers are protected against damage by big blisters and mechanical misadjustment.

Combination with Other Measuring Systems

The Ultrasonic Camera UPU 3000 is a modular system that can be adapted to changing requirements at any time.

It can be combined with the GreCon Thickness Gauge DMR 3000 and the GreCon Board Scale to a quality assurance station.

The visualisation software of all GreCon measuring systems is based on Windows. The software of the UPU 3000 consists of the following program modules:

- Recipe Management

This is a product data base in which different panel types and production parameters, which are relevant for the measuring system, can be stored.

- Visualisation

The core of the software package is the visualisation software. It records, stores and graphically represents all measured data. The simple menu structure, which is identical for all GreCon measuring systems, makes an intuitive operation possible. Clear information and graphics enable the operator to quickly and effectively adjust the running production process. The measured panels are graphically represented in up to 250 colours. The colour balance gives information on the quality and homogeneity of the panels after pressing.

- Quality Indicator

A clear indication of the current bond quality is the quality indicator. All measured values of a panel are compressed and represented as a quality key on a scale, similar to a speedometer.

- Long-Time Graphic

To represent the trend of the panel quality, the maximum value, the quality key as average value and the minimum value of a panel are shown in a long-time graphic.

Furthermore, the homogeneity of the panel, referring to the bond quality, and the occurrence of blows and their size, measured over a longer time period, can be compressed and shown in this graphic.

- History Data Base

This data base stores the measured values and provides a function to export them to other file formats for further processing and evaluation.

Network Connections

For the data transmission to higher-ranking process control systems, different interfaces, such as NET DDE, Allen Bradley Ethernet or Ethernet with TCP/IP or H1 BUS protocol, are available.

Online After-Sales Service

GreCon measuring systems are equipped with a modem, by means of which a direct connection to the GreCon after-sales service can be made. Support, changes in parameters, software updates and trouble shooting are all possible online.

Production Course

From the measured data, production processes can be easily traced or analysed over time. If this data is combined with other production data, further optimisation potentials can be revealed and taken advantage of.

Screenshot 1

Upon production start-up, a wasteful and expensive panel quality was produced. The expensive quality was immediately identified and corrected.

Screenshot 2

Although the quality key was relatively high, there were small blows throughout the panel. As production progressed, the quality key continued to decrease. Big blows became apparent. The size of the blows can be seen from the quality key. A drop of the minimum value and a reduction of the quality key indicate large blisters.

Screenshot 3

A better, but still expensive panel quality is produced by changes in the production process. However, this is a controlled procedure. After the change, the maximum value is much more constant.

Technical Specifications

- Mains voltage: ..... 230 V / 115 V
- Frequency: ..... 50 Hz / 60 Hz
- Power consumption: ..... 750 VA
- Compressed air supply: ..... 6 bar / 90 psi
- Compressed air consumption: ..... approx. 145 l/h / 0.1 cfm
- Max. number of inspection channels per electronics evaluation: 22
- Panel thickness: ..... max. 40 mm (option 90 mm) max. 1.75 in (option 3.5 in)
- Conveying velocities: ..... max. 250 m/min / 750 fpm
- Minimum defect size: ..... 35 mm x 35 mm / 1.4 in x 1.4 in
- Diameter of measuring spot: ..... 50 mm / 2 in
- Mechanical width per inspection channel: .... 110 mm / 4.33 in

References

- MDF board
- HDF board
- Hardboard
- OSB board
- Particleboard
- Plywood
- Composite materials

System Advantages

- Automatic calibration
- Automatic dirt accumulation control
- Closed ceramic transmitters
- Integrated self-diagnostic system
- Receivers movable forwards and backwards
- Patented ultrasound reflection plate
- Modular design

- Recipe data base for automatic production change-over
- Graphical representation of the bond quality in up to 250 colours
- Quality indicator
- Long-time graphic to show the quality trend
- Storage of the measured data in a history data base
- Joint visualisation with the GreCon Thickness Gauge and the GreCon Board Scale possible
- Preparation for network connection is standard
- Online after-sales service

After the Press

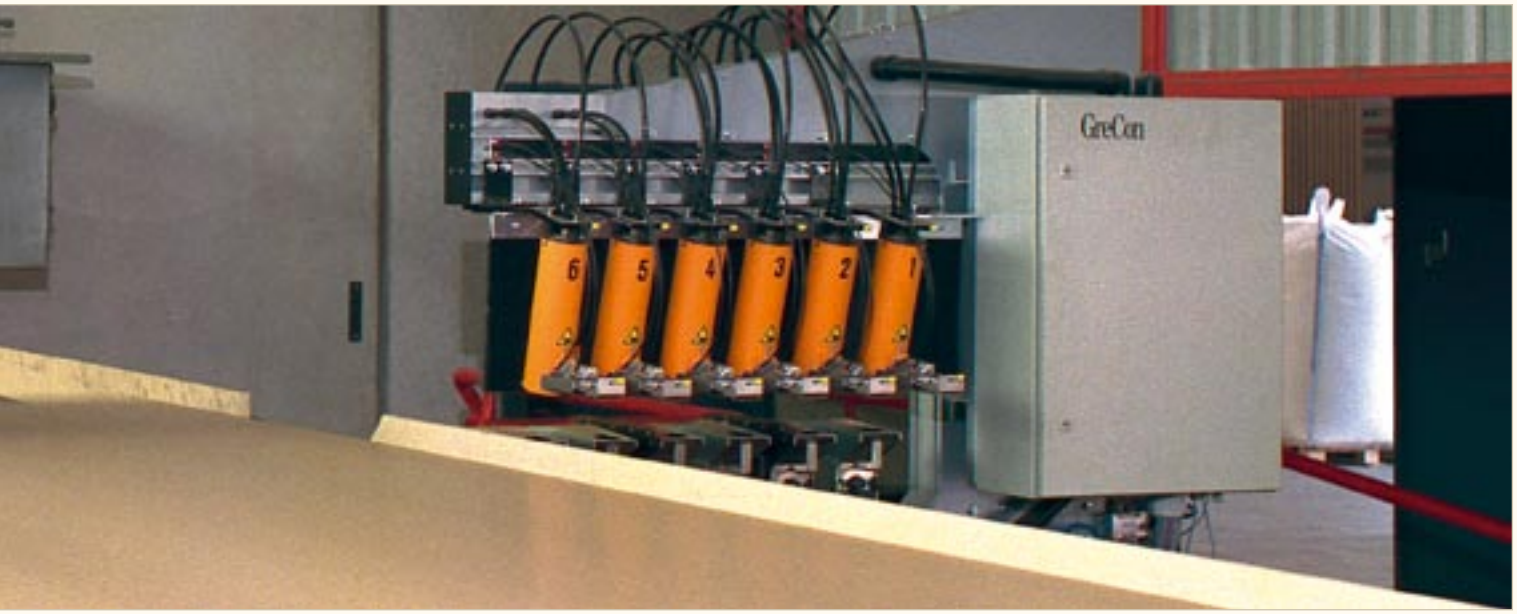
In the wood based industry, ultrasonic cameras are combined with GreCon Thickness Gauges DMR 3000 and Board Scales to Quality Assurance Stations TRI. All data is recorded by one central computer and visualised on two monitors. An optimum evaluation of the production process is achieved by further measurement of the cool panel. For this purpose, an additional UPU system is installed after the last cooling zone.

After Lamination

A fully automatic inspection of the coating of carrier panels with laminates or veneers is also done with the ultrasonic camera. To ensure a complete monitoring of the entire panel surface, several systems are arranged out-of-line on separate frames.

On the Sanding Line

For final quality control of the finished wood based panel, the UPU 3000 is installed after the sanding line.



ct-frame, one side in calibration/maintenance position

GreCon

Fagus Factory, constructed by Walter Gropius in 1911

GreCon
P.O.BOX 1243
D-31042 ALFELD/HANNOVER
GERMANY

TEL.: +49 (0) 5181-790
FAX: +49 (0) 5181-79229
E-MAIL: sales@grecon.de
WEB: www.grecon.de