

STENOGRAPH

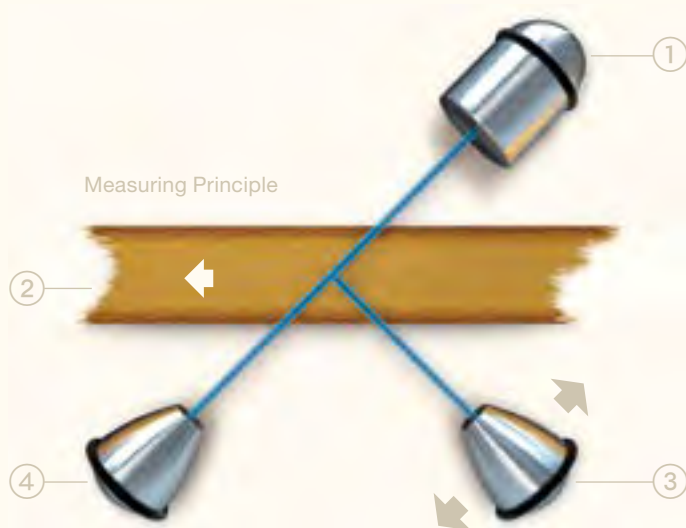
Online Monitoring the Density Distribution
with the Density Analyser



GreCon®

Influence the Features of Wood Based Panels with the GreCon Raw Density Measuring System

For MDF, particleboard and OSB boards, the raw density has a decisive influence on the panel quality. For the economic production of wood based panels, this parameter is one of the most important that needs to be monitored and optimised. Depending on the end use of the wood based panel, different density profiles are required. Continuous online monitoring is necessary in order to ensure optimum adjustment of the production line. Using the Raw Density Profile Analyser StenOgraph allows operators to adjust the production process to maximum efficiency.



Increasing the Productivity

Due to non-optimal raw density profiles, wood based panels are often manufactured with an elevated raw density. Our clients informed us that by using the StenOgraph they were able to reduce the average raw density by 2.5 % or more.

When switching from one product type to another, a certain „running-in“ time is necessary for new product parameters. With the StenOgraph the specified parameters are achieved within a much shorter period of time. In a typical MDF production plant, the costs of substandard products from product switch over were reduced by 33 % using the StenOgraph system.

Minimising the specific press time while increasing the capacity by approximately 4.000 m³ per year is considered realistic.



Measuring Principle

The measuring principle of the raw density measuring system StenOgraph is based on a combination of x-ray transmission and forward scatter. The imaging geometry is designed to determine the density profile of a moving panel directly at the outlet of a continuous press.

A narrowly focused x-ray beam (1) penetrates the cross section of the moving panel (2), preferably at an angle of 45°. A scanning detector system (3) records the density-dependent scattered radiation along the plane of the panel and a stationary detector (4) records the transmitted radiation.

By combining both signals, the density of any part of the panel cross section is calculated directly. Thus, a scan of the full thickness as well as a sub-scan of selected areas can be made.

Construction of the System

The main body of the raw density profile analyser consists of a solid aluminium O-frame. All cable connections leading to the components like x-ray tube and detector unit are installed within the O-frame to prevent external damage or influence.

The housing above the panel is equipped with a swing-out mechanism to protect against the impact from blisters of up to 200 mm (8 inches) height.

The measuring device itself is protected from dust and moisture by a positive pressure air system.

A water cooling function is included in the x-ray tube which is continuously monitored through temperature sensors. If the temperature limit is exceeded, the x-ray tube is automatically switched off.



Software

The visualisation software of all GreCon systems is based on Windows®. The software of the StenOgraph consists of the following program modules:

Recipe Management

All system and product parameters required for one product type are stored in the protocol data base.

Calibration

The quality of the measuring results depends on consistent conditions during measurement. Because this cannot be reliably ensured under industrial conditions, the GreCon Raw Density Profile Analyser is equipped with a calibration check function. During this procedure, the measured profile is compared with a reference profile.

Visualisation

The core of the software package is the visualisation software. It records all measured values and processes them graphically. The simple menu structure makes an intuitive operation possible.

Clear information and graphics enable the operator to quickly and effectively adjust the online production process. Using a waterfall graphic (optional), it is possible to represent the last six raw density profiles in order to monitor the development of the raw density profile during production start-up and the running production process. Standard profiles are faded in so that deviations from the rated value can be easily recognised.

Software Module FB

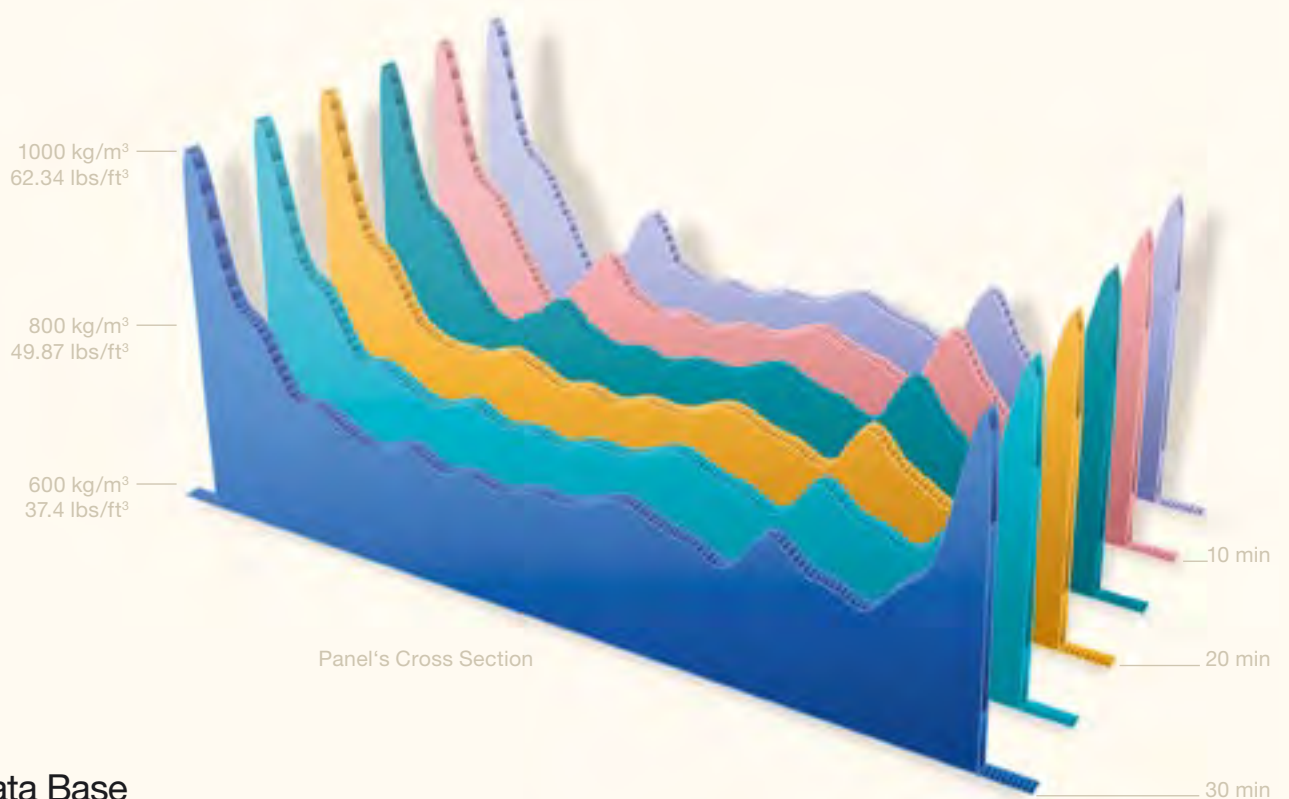
The software module FB is used for better representation of local non-homogeneities of the raw density profile of thin panels. Local non-homogeneities are both surface layers and low density areas in the transition area of surface layer and core layer.



Graphical Display

Comparison of several Measurements

3D Waterfall Graphic



History Data Base

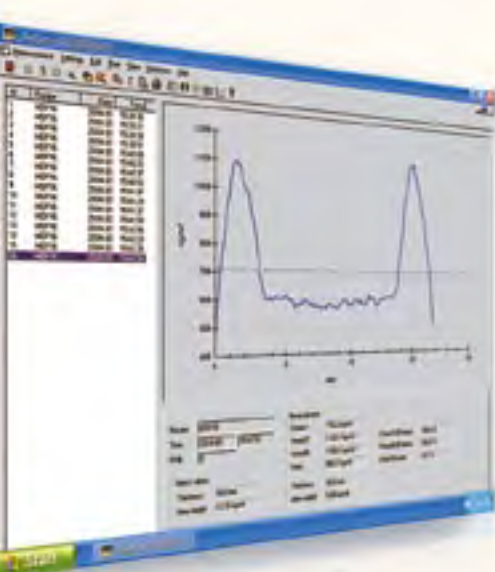
In this data base, measured values can be stored and exported to other file formats for further processing.

Network Connections

Besides the local evaluation and recording of measured values by the visualisation computer, the StenOgraph can be linked with higher-ranking process control systems via different interfaces, such as NET DDE, Allen Bradley Ethernet or Ethernet with TCP/IP or H1 BUS protocol.

Online After-Sales Service

GreCon measuring systems are equipped with a modem for a direct connection between the GreCon after-sales service and the measuring system. Changes in parameters, software updates and support are all possible online.



History Data Base with Graphical Display

Technical Specifications

- Mains voltage:..... 230 V / 115 V
- Frequency: 50 Hz / 60 Hz
- Power consumption:.....approx. 5 kVA
- Compressed air supply:..... 6 bar
90 psi
- Compressed air consumption:approx. 1.800 l/h
0.001 cfm
- Panel thicknesses:3 up to 42 mm
0.12 up to 1.75 inch
- Measuring velocity:..... adjustable
0.5 up to 10 s/mm panel thickness
0.02 to 0.4 sec/inch panel thickness

References

- Particleboard / MDF board / OSB board / HDF board

Hardware Advantages

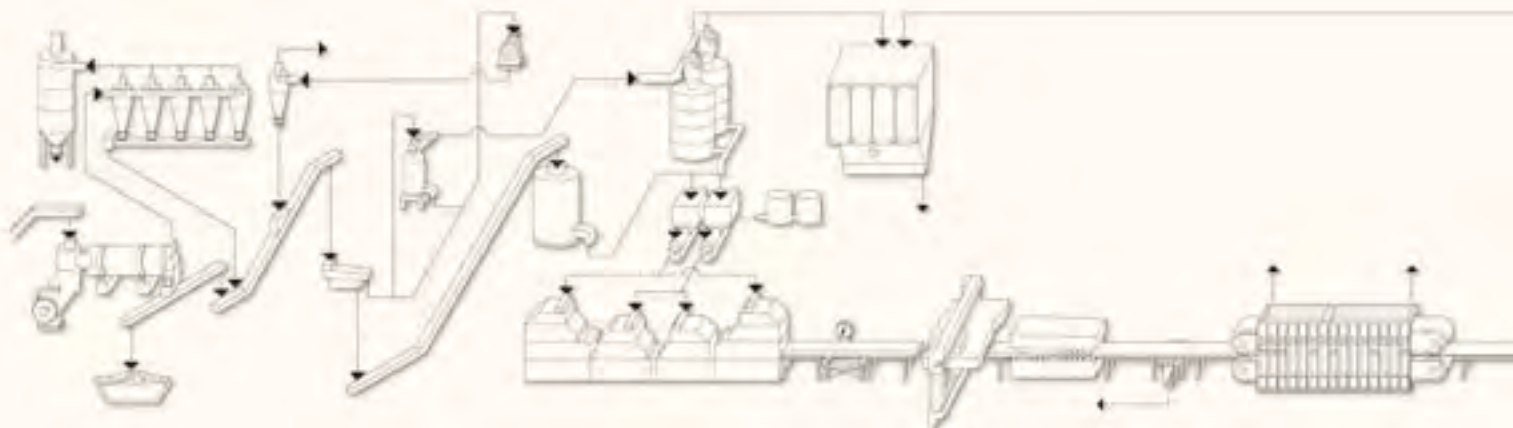
- O-frame is easily adapted to plant configuration by the modular design
- The motorised sensory array allows a choice of various measuring positions
- Calibration position outside of the roller conveyor, i.e. calibration and maintenance work is possible during running production

Software Advantages

- Windows® operating system
- Recipe data base for automatic production change-over
- Storage of the measured data in a history data base
- Preparation of network connection is standard
- Telediagnostic service through GreCon after-sales



Detailed View on Detector Unit



Measuring Position

The measuring position is at the outlet of a continuous press. X-rays are directed through the panel. The density distribution is evaluated from the absorption and distribution of this radiation. The profile is displayed on a screen in the same way as a laboratory density analyser. The measuring time takes just a few seconds, depending on the panel's thickness. Measurement is made in the same position for every panel.

The installation place is at the exit of a continuous press, i.e., the density profile is determined before (in exceptional cases also after) the cross-cut saw.



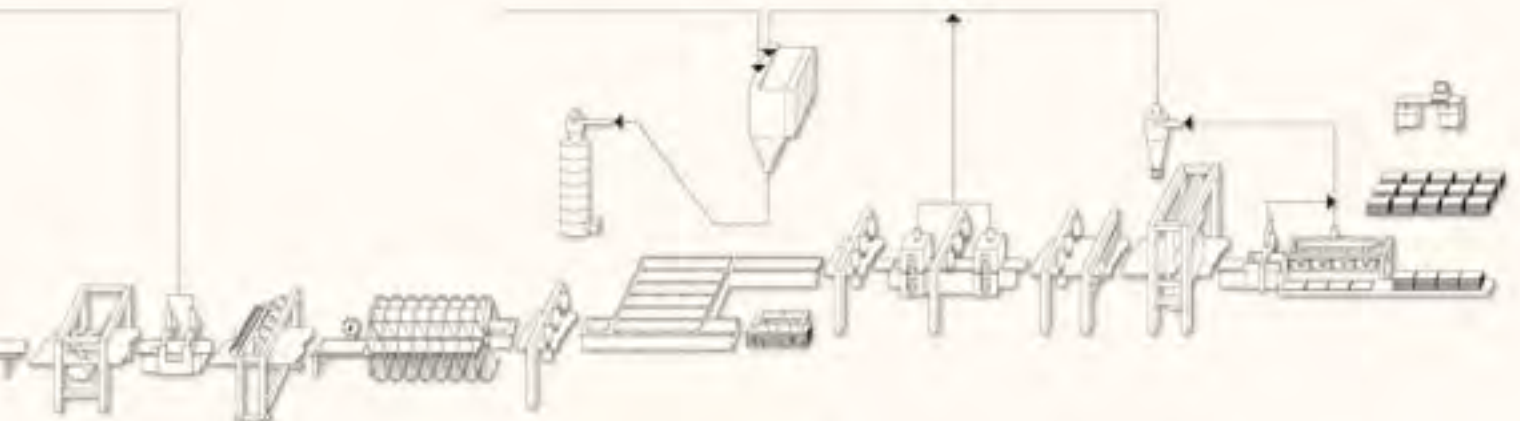
Detailed View on complete Measuring Transducer

Reducing Starting-up Periods

Starting-up periods of continuous production lines are very costly and time-consuming whereas the raw density profile analyser will pay off within only a few months due to reduced starting-up periods and an increased productivity.

Safety is important to GreCon

All shielding of x-ray sources surpass governmental requirements. A dust hood protects all moving parts. All cables are installed in the O-frame to protect them from damage.



GreCon



Fagus Factory, constructed by Walter Gropius in 1911

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GreCon

Inline Weight
Measurement with
the Continuous
Board Scale

GreCon

Fire
Protection

GreCon

Measuring
Technology

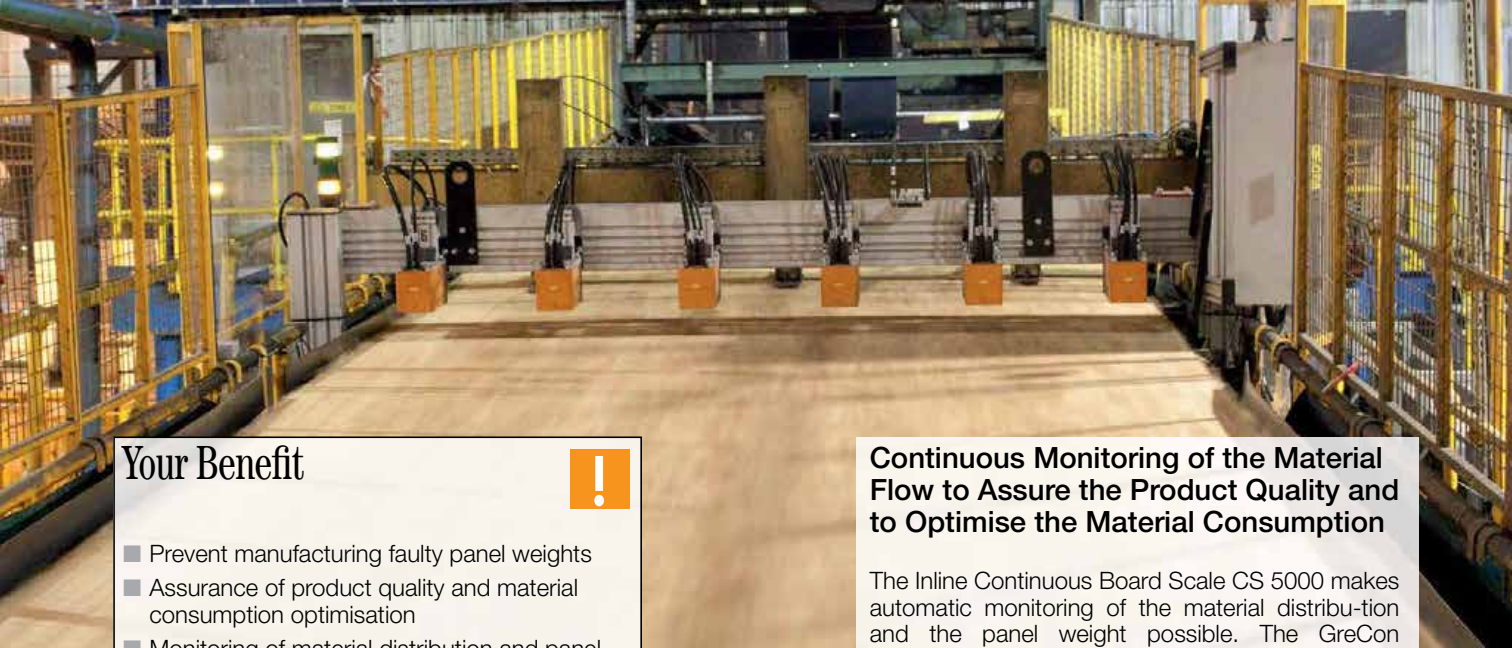
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Service



EN | R.02 | 2015.04
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CS 5000



Your Benefit



- Prevent manufacturing faulty panel weights
- Assurance of product quality and material consumption optimisation
- Monitoring of material distribution and panel weight on a continuous basis
- Ideal for high production speeds
- Installation in limited space possible (e.g. press extensions)
- Calibration with homogeneous test samples allows precise measurements

Continuous Monitoring of the Material Flow to Assure the Product Quality and to Optimise the Material Consumption

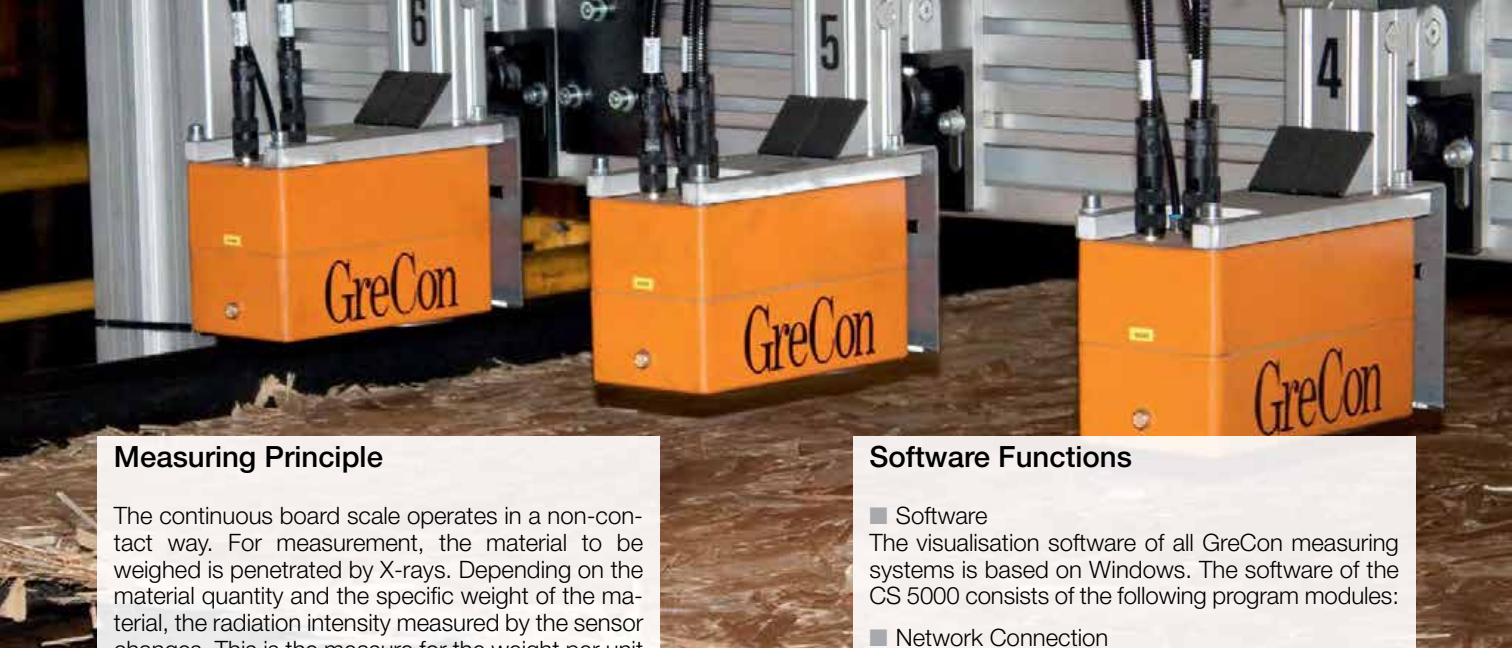
The Inline Continuous Board Scale CS 5000 makes automatic monitoring of the material distribution and the panel weight possible. The GreCon Continuous Board Scale CS 5000 is ideal for production lines with very high production speeds and in limited space conditions. Contrary to the usual board scales using weighing tables, the CS 5000 shows the weight distribution within the measured panel across production. The use of the Continuous Board Scale CS 5000 in endless production or in the measurement of single panels is possible.

Using the optional link to a GreCon thickness gauge, the average raw density and its distribution within the panels can also be calculated and used to optimise the process.

Why GreCon



- Quick and timely recognition of weight deviations
- Clear display of the effects of changes in the production
- Display of optimisation potentials
- High accuracy and reliable measured values
- Flexible use with various products
- Reduction and elimination of rejects
- Expandable and intergration of other systems possible (e.g. a thickness gauge to evaluate the raw density)



Measuring Principle

The continuous board scale operates in a non-contact way. For measurement, the material to be weighed is penetrated by X-rays. Depending on the material quantity and the specific weight of the material, the radiation intensity measured by the sensor changes. This is the measure for the weight per unit area (kg/m^2).

Visualisation of the CS 5000



Software Functions

■ Software

The visualisation software of all GreCon measuring systems is based on Windows. The software of the CS 5000 consists of the following program modules:

■ Network Connection

For the data transmission to higher-ranking process control systems, different network connections, such as OPC or ODBC, are available.

■ Visualisation

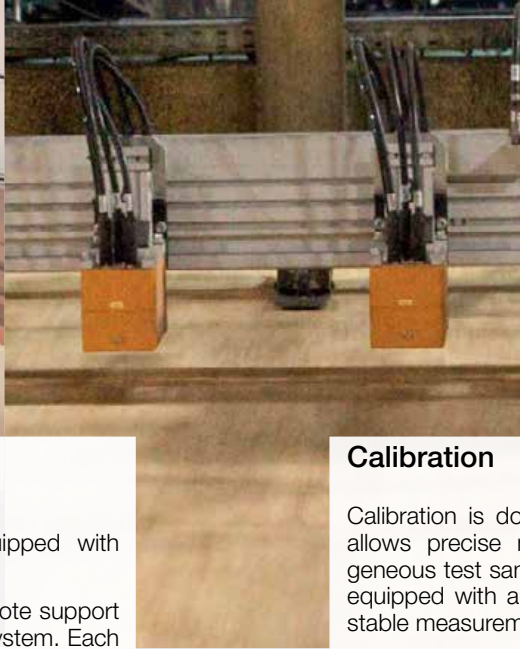
The core of the software package is the visualisation software. It records, stores and graphically represents all measured data. The simple menu structure, which is identical for all GreCon measuring systems, makes intuitive operation possible. Clear information and graphics enable the operator to quickly and effectively adjust the running production process.

■ Recipe Management

This is a product database in which different panel types and production parameters for the system can be stored.

■ Database

The database stores the measured values and provides a function to export them to other file formats for further processing and evaluation. A uniform data structure provides easily accessible data for process control systems.



Service

■ Online Support

GreCon measuring systems are equipped with GreCon online support SATELLITE.

This provides safe, simple and fast remote support when there is trouble or to check the system. Each online support is logged and stored in the system's history.

Technical Specifications

- Supply voltage..... 230 V / 115 V
- Frequency 50 Hz / 60 Hz
- Power consumption500 VA
- Compressed air supply.....6 bar
- Measuring range...2 to 40 kg/m² (0.4 to 8 lbs/ft²)
- Transport speed max. 120 m/min
- Number of measuring tracks..... 1 to 10
- X-ray tube..... max. 50 kV at 1 mA
- Repeating accuracy± 10 g/m² (± 1 σ)
- Measuring resolution better than ± 20 g/m²
at 40 kg/m²
..... better than ± 5 g/m²
at 2 kg/m²

Calibration

Calibration is done outside the material flow and allows precise measurements thanks to homogeneous test samples. Additionally, the CS 5000 is equipped with a calibration check, which ensures stable measurements.

References and Applications

- Wood based panels:
before or after cross cut saw
- Insulating material:
hot end or cold end
- Electrical insulation material
(transformer board):
after the press
- Wheat straw chips:
after the press
- Plastic granules:
after the press
- Machined car parts:
after the press

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GreCon

Inline Weight Per
Unit Area Gauge to
Measure the Material
Distribution

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Fire
Protection

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Measuring
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Service



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BWQ 5000



Your Benefit



- Optimisation of material consumption
- Monitoring of material distribution
- Fast traverse movement - quick and strip-wise measurement of the cross profile to quickly intervene in the production process
- Measurement of the longitudinal profile for detection of systematic distribution failures lengthwise/crosswise
- Automatic calibration with homogeneous test samples for best quality of measured values
- Intuitive operation using TOUCH

Reliable Measurement of the Material Distribution to Optimise the Material Consumption

The GreCon Weight Per Unit Area Gauge BWQ 5000 ensures a high product quality while the use of raw material and energy is optimised. The properties of particleboard, MDF and OSB board depend on the precise spreading of the mat. The main goal of using a BWQ 5000 is the optimisation of material consumption. A heavy board is still acceptable to the end customer, but the material and production costs are much too high for the manufacturer. A board that is too light has only poor quality properties.

The BWQ 5000 monitors the material distribution of loosely spread or pre-pressed wood based mats. Graphical and numeric representations enable the operator to adjust the forming process to achieve consistent panel quality while the use of material and energy is optimised.

Why GreCon



- Display of optimisation potentials
- Flexible use with various products
- Additional possibility for weight per unit area measurement
- 3 operation modes: cross, stationary and step mode
- Variable traversing speed in cross mode



Inline Weight Per Unit Area Measurement with X-Ray Technology

The continuous monitoring of the mat distribution across the production prior to the main press ensures an optimum production flow. Belt tracking caused by imbalances in the mat can be prevented.

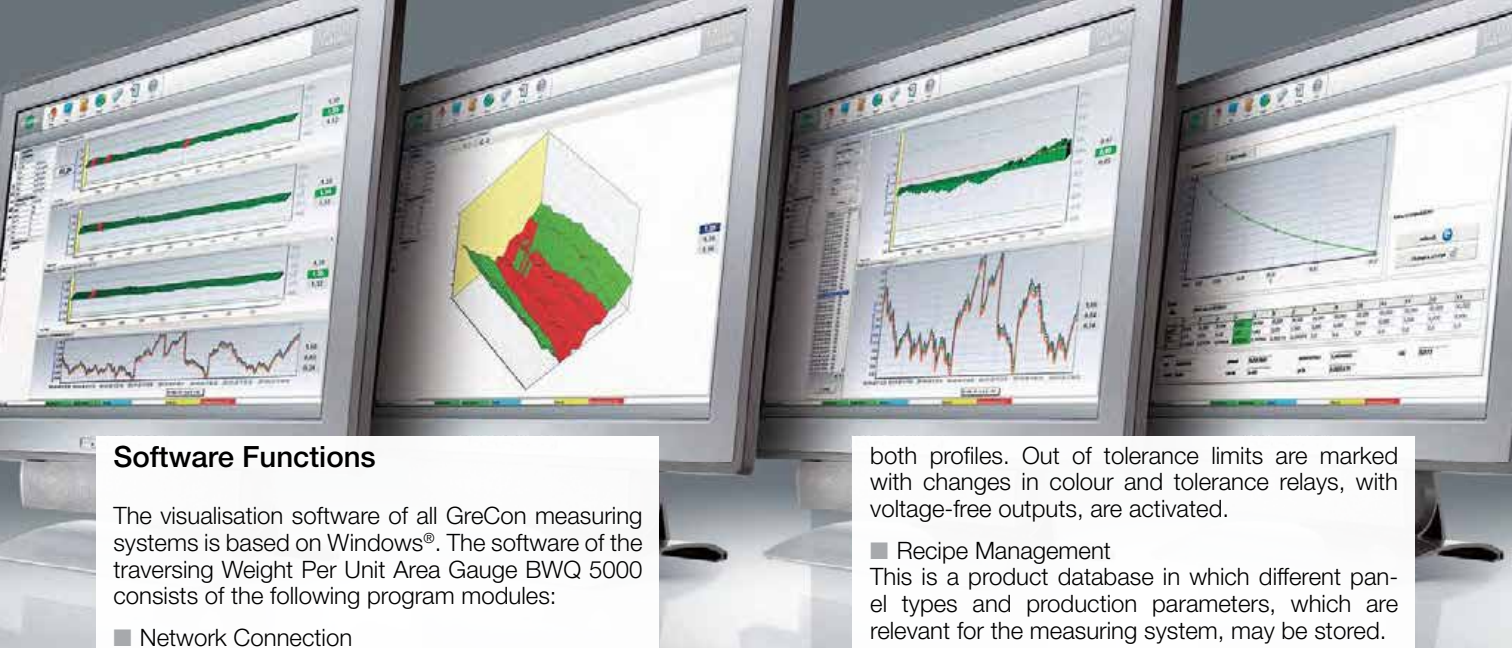
The recorded measured data makes it possible to easily trace production processes to expose optimisation potentials. With the BWQ 5000 information combined with other process data in a higher-ranking process control system, additional optimisation potentials are revealed.

Measuring Principle

The weight per unit area gauge works in a non-contact method. An X-ray source is installed below, and a high-precision sensor above the material. Depending on the specific density and the amount of the material, more or less X-radiation is measured by the sensor. This is a measure for the weight per unit area (kg/m^2 / lbs/ft^2).

Operation Modes

The GreCon Weight Per Unit Area Gauge BWQ 5000 can operate in three different modes. The measurement of the material distribution across the production is done in cross mode and in both directions. Should a special zone be analysed more precisely, or, should the longitudinal profile be measured, the measurement transducer can measure in stationary mode at a certain position. Should several positions be analysed one after the other, this is done in step mode at predetermined time intervals or at certain points on the mat.



Software Functions

The visualisation software of all GreCon measuring systems is based on Windows®. The software of the traversing Weight Per Unit Area Gauge BWQ 5000 consists of the following program modules:

■ Network Connection

For the data transmission to higher-ranking process control systems, different network connections, such as OPC or ODBC, are available.

■ Visualisation

The core of the software package is the visualisation software. It records all measured values and processes them graphically. The simple menu structure, which is standard for all GreCon measuring systems, makes intuitive operation possible. Clear information and graphics enable the operator to quickly and effectively intervene in the running production process. The measured values are represented as a profile. Since measurement can be effected in three different operation modes, the mode determines how the profile is represented: as cross profile, as longitudinal profile or a combination of

both profiles. Out of tolerance limits are marked with changes in colour and tolerance relays, with voltage-free outputs, are activated.

■ Recipe Management

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

■ Database

The database stores the measured values and provides a function to export them to other file formats for further processing and evaluation. A uniform data structure provides easily accessible data for process control systems.



Service

GreCon measuring systems are equipped with GreCon online support SATELLITE. This provides safe, simple and fast remote support when there is trouble or to check the system. Each online support is logged and stored in the system's history.

Technical Specifications

- Supply voltage..... 230 V / 115 V
- Frequency 50 Hz / 60 Hz
- Power consumption 1,500 VA
- Compressed air supply.....6 bar (90 psi)
- Measuring ranges.. 2 to 40 kg/m² (0.4 to 8 lbs/ft²)
- X-ray tube..... max. 50 kV at 1 mA
- Repeating accuracy ± 10 g/m² (± 1 σ)
- Measuring resolution better than ± 20 g/m²
at 40 kg/m²
..... better than ± 5 g/m²
at 2 kg/m²

Calibration

- Automatic Calibration
The quality of the measuring results essentially depends on constant conditions during measurement. To obtain a high measuring accuracy, the BWQ 5000 is calibrated automatically at regular intervals. For automatic calibration, an appropriate sample is placed in the calibration position, which is located near the material flow.

BWQ calibration unit in operation





References

- Particleboard
- MDF board
- HDF board
- Hardboard
- OSB board
- Insulating material (mineral wool and insulating board)
- Machined car parts
- Rigid foam board

Applications

In particleboard and OSB board production lines, the traversing weight per unit area gauge is installed directly after the forming station. In MDF production lines, it is used after the pre-press. An additional measurement of the completed panels is also possible. This is especially useful where the measurement of the material distribution prior to the press is impossible or additional information is desired.

Diverse application possibilities

