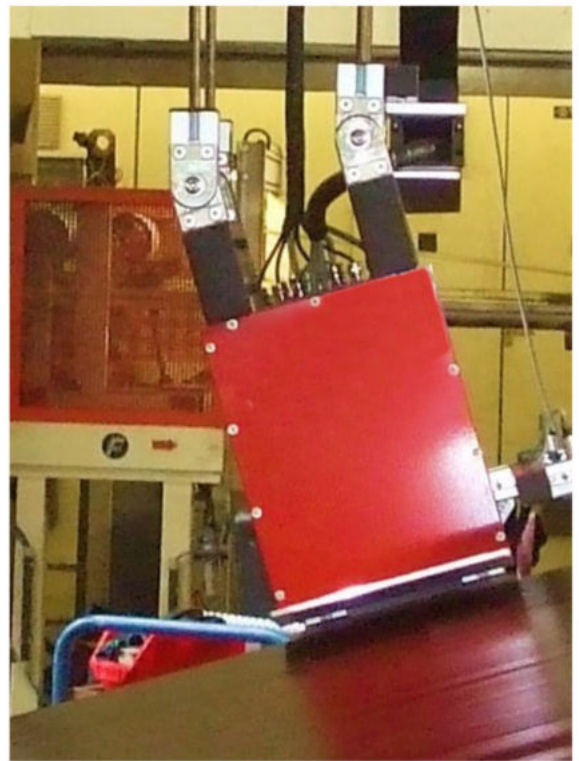


# GrammageScan



**Inline -  
Grammage  
Measurement System**  
for Web-like Materials

- *Inline measurement from the first meter*
- *Precise measurement of the grammage*
- *Safe measurement using microwaves*
- *Robust & low-maintenance*
- *No safety requirements to be met*

# GrammageScan

## Measurement Principle

GrammageScan is the innovative system for inline grammage measurement of web-like products such as impregnated papers, textiles, or foils. It has been especially developed for this application. The system is integrated at a suitable point in the production process. Equipped with an automatic motion facility, the sensor reliably finds the edge of the product even when product widths vary, and measures the grammage there at a permanently defined distance. If necessary [for example, when the product is changed], the measuring head can be withdrawn completely from the production process. This permits unhindered access to the production plant.

The measurement principle is based on the change in a microwave field as it passes through the web material. The measurement arrangement comprising a transmitter and receiver generates an electromagnetic field. When they penetrate the web-like material, the electromagnetic waves change their velocity of propagation as a function of the grammage. The change is directly proportional to the grammage. Consequently, the measurement system is simple to calibrate, that is, set to the material being measured. Despite the low power output of 20 mW, non-metallic materials up to 10 mm thick can be irradiated with microwaves and measured.

## Safety

The low power output means the product does not alter in any way and no safety measures have to be implemented to protect operating and service personnel. Unlike with conventional radiometric techniques, no regular checks of the equipment by the relevant authorities or provision of a safety officer are necessary.

The low maintenance requirement means that follow-up costs remain low and capital recovery time is fast.

*Photo: GrammageScan on running track*





## Advantages at a Glance

- Microwave-based grammage measurement
- Grammage measurement up to 10-mm thickness
- Continuous monitoring of the grammage of web-like materials from the first to the last meter [long-term measurement]
- 4-20 mA output signals for further processing in the plant's controllers
- Optional: Intranet connection between the measurement system and the operator terminal using a COM server application
- No radiometric emitters
- Long-term stability of calibration
- No safety precautions necessary
- Low running costs
- Good Return on Investment



# GrammageScan

## The 2PMR Measuring Method

The measuring method is based on the effect of electromagnetic waves as they pass through a product in which the waves are propagated.

The 2-PMR method uses the effect of the waves to determine certain parameters of the product.

The velocity of propagation, for example, is directly inversely proportional to the mass; as the mass increases, the velocity of propagation decreases.

This change in the propagation velocity is measured by the system and the grammage is determined by calibration, that is, setting to a particular product.

The measuring system measures the grammage approximately 600 times per second. This ensures continuous measurement during the production process and gapless monitoring.

The 2-PMR grammage measurement method is insensitive to disturbance variables. Any changes in the product to be measured affect precision only slightly.

Both the décor and the resin content can vary. Despite large variations in the measured samples, very good matches with the reference method, grammage measurement with scales, are achieved. The GrammageScan measurement system only requires a small number of calibration curves to measure different products.

Fig. 1: Propagation of electromagnetic field lines

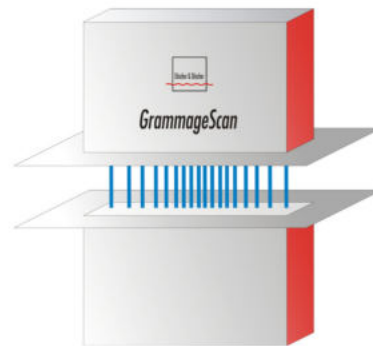


Fig. 2: Decrease in the propagation velocity

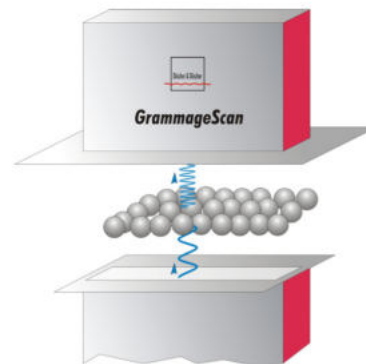
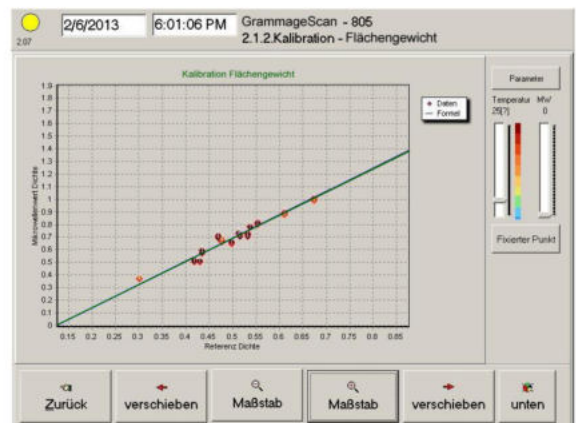


Fig.3: Calibration curve for different impregnated media

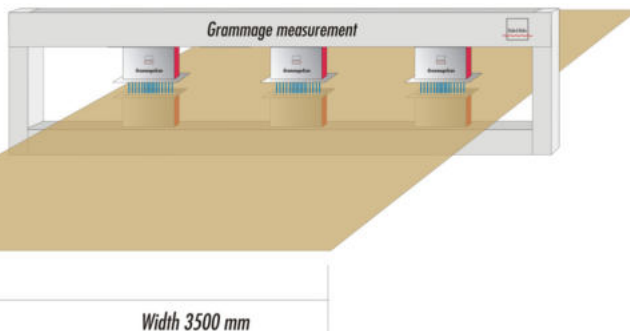


## Results from Practical Applications

GrammageScan can be used for various applications. These include measurement of the glue content in an impregnated medium, the coating thickness on a carrier material, or the grammage of a nonwoven.

The possible applications are numerous; the only requirement is that the material to be measured must be able to absorb electromagnetic waves.

Fig. 4: Formation with some sensor heads



## Combined Measurement

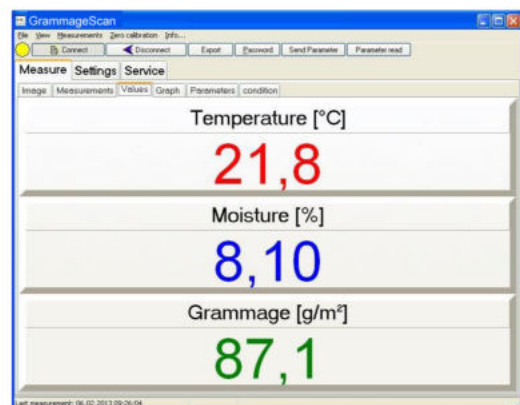
Döscher & Döscher also offers combined measurement systems for moisture and grammage measurement.

These systems combine the advantages of the VenScan LMS measurement method (see separate brochure) and grammage measurement with the GrammageScan system.

Both systems are integrated in a single unit and measure the same region of the web material.

This makes swift and easy implementation of these measurement variables into the production process possible.

Fig. 5: Screenshot of all possible measured values



# GrammageScan

## Software ISensorControl

ISensorControl makes operation [system settings, calibration, measurement and visualization] of GrammageScan easy.

### Setting the system configuration

- Language [German, English]
- Communications interfaces
- Interfaces for digital inputs and outputs and analog signal outputs with 4-20 mA [grammage and temperature]

### Calibration

- Recording of measurement points
- Calculation and storage of calibrations

### Measurement

- Reference measurements/ hardware calibration
- Measured data management/ archiving intervals/ threshold values

### Selecting measurement from the stored data

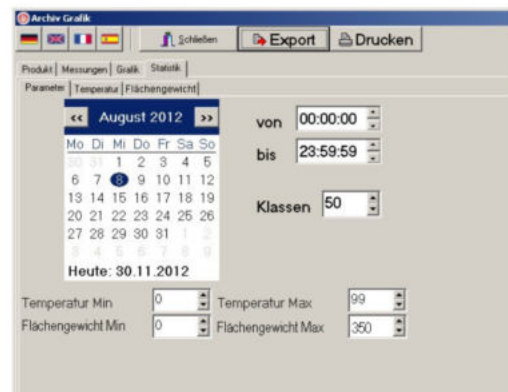
The measurements are stored separately by product type, and can be selected separately.

Furthermore, the time range to be selected can be narrowed down further.

A selection menu with the following functions is provided for these actions:

- Selection of measured values via calendar function
- The measured values can be narrowed down further by entering a time
- The grammage and temperature range display can be customized

Fig. 6: Screenshot - Selection via calendar





## Displaying the Measurements

With the evaluation software I SensorGraph, the data collected from online moisture measurement and automatically stored can be selected, viewed, visualized, and analyzed. Selected data and graphics can be exported into common file formats.

The data can be displayed in three different ways:

- *as a list*

The measurements are displayed one above the other with consecutive numbering, date/time, and temperature and grammage value.

- *as a time chart*

The measured grammage values are displayed graphically over the selected time period.

- *as a histogram*

The grammage values are displayed as a frequency distribution across a selectable number of classes.

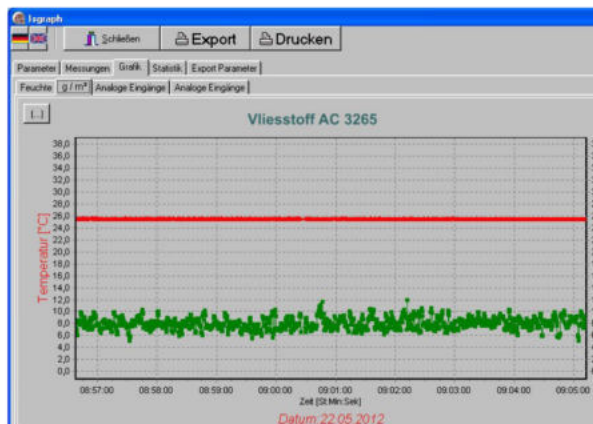
Visualization, analysis, and export

- Graphic display of grammage [g/m<sup>2</sup>] and temperature progression [°C]
- Statistical evaluation of measurement result
- Export of data and graphics

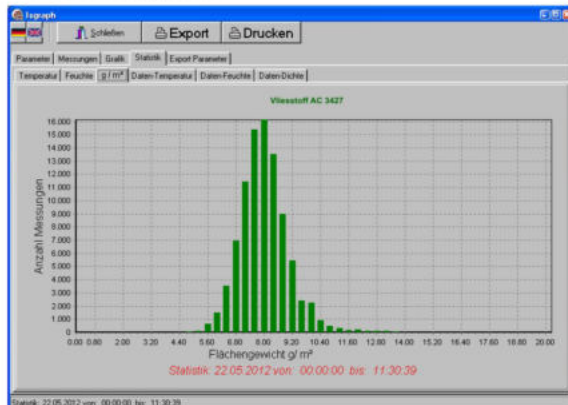
As a List

No	Zeit	Temperatur [°C]	Feuchte [%]	Bemerkungen
1	01.08.2012 00:00:08	52,7	7,5	
2	01.08.2012 00:00:18	52,7	7,4	
3	01.08.2012 00:00:29	52,7	7,5	
4	01.08.2012 00:00:39	52,7	7,4	
5	01.08.2012 00:00:49	52,7	7,4	
6	01.08.2012 00:00:59	52,7	7,4	
7	01.08.2012 00:01:09	52,7	7,4	
8	01.08.2012 00:01:20	52,7	7,5	
9	01.08.2012 00:01:30	52,7	7,5	
10	01.08.2012 00:01:40	52,7	7,5	
11	01.08.2012 00:01:50	52,7	7,6	
12	01.08.2012 00:02:01	52,7	7,6	
13	01.08.2012 00:02:11	52,7	7,6	
14	01.08.2012 00:02:21	52,7	7,6	
15	01.08.2012 00:02:31	52,7	7,6	
16	01.08.2012 00:02:41	52,7	7,6	
17	01.08.2012 00:02:52	52,7	7,6	
18	01.08.2012 00:03:02	52,7	7,6	
19	01.08.2012 00:03:12	52,7	7,6	
20	01.08.2012 00:03:22	52,7	7,6	
21	01.08.2012 00:03:32	52,7	7,7	
22	01.08.2012 00:03:43	52,7	7,7	
23	01.08.2012 00:03:53	52,7	7,7	

As a time chart



As a histogram



# GrammageScan

## Components

	Gap sensor
	Connection cabinet
	Operator terminal [optional]
	Motion unit

## Technical data

Measuring range:	0 - 2000 gr/ m <sup>2</sup>
Repeatability:	+/- 2 % of measurement range
Number of measurements:	Up to 600 measurements per second, mean value calculation can be set in the software
Power supply:	24 VDC, 10 A
Product temperature:	0 – 70 °C
Ambient temperature:	0 – 40 °C
Max. number of different calibrations:	32
Interfaces of workstation:	
- serial	RS422
Interfaces of sensor:	
- analog	1 x input [4 – 20 mA] 2 x outputs [4 – 20 mA, optionally for grammage and temperature]
- digital	2 x outputs
Dimensions:	
- Total length:	300 cm or as per customer order
- Total width:	approx. 50 cm

### Subject to change without prior notice!

Can be used for the following material:	Web-like materials: e.g. decorative paper, finish foils, overlays, underlays, laminates, corrugated paper, foils, textile webs
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Die Informationen zur Messtechnologie finden Sie ebenfalls auf unserer Website, Short-Code: <https://tinyurl.com/messverfahren>



Döschers Microwave Systems GmbH  
Siemensstraße 11  
D 25462 Rellingen

+49 (0) 40 879 76 77-0  
info@doeschersystems.com  
www.doeschersystems.com

