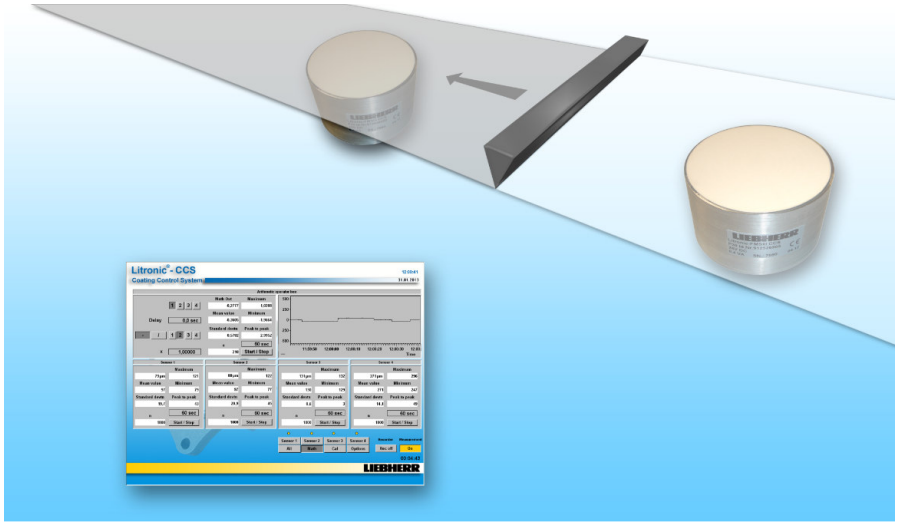
Liebherr InSitu/online coating control system type Litronic-FMS III / CCS



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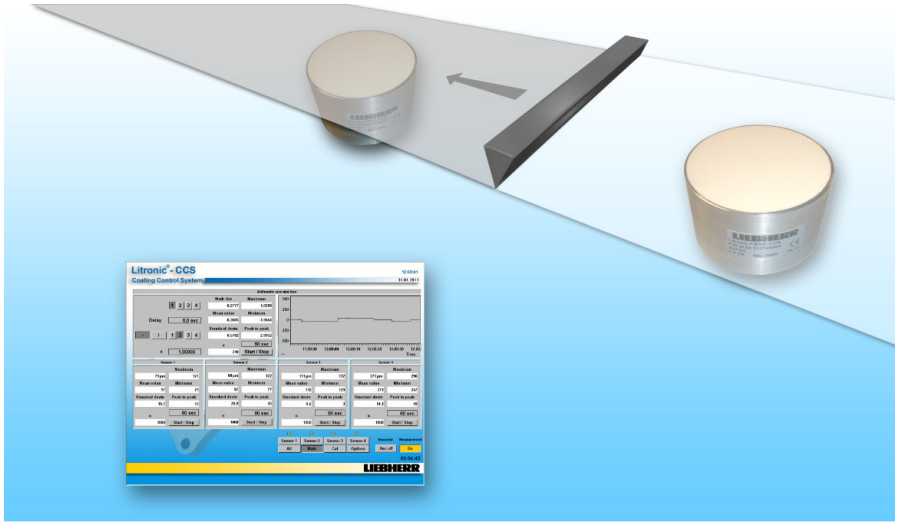
Liebherr Litronic-FMS III / CCS



Coating on:

- **paper**
- **cardboard**
- **plastic film**
- **card web**
- **textile**
- **…**

Sensor installations before and after coating for an exact determination of coating thickness or weight per unit area.

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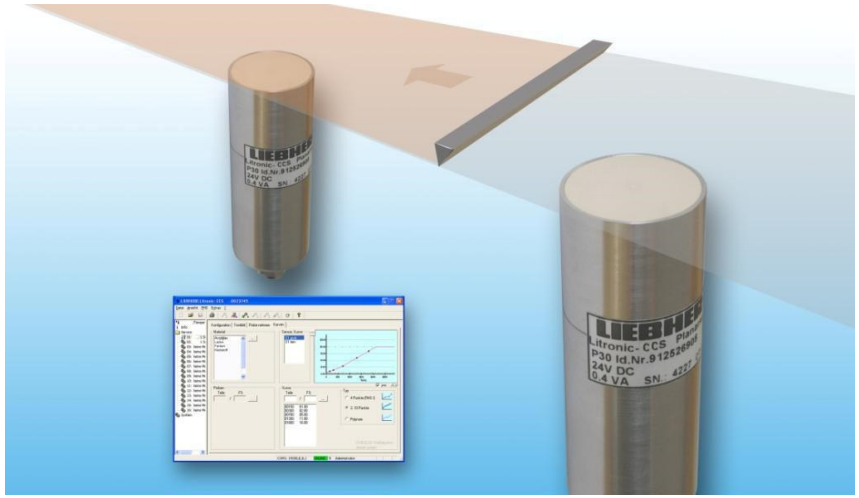
Online Coating Control System CCS by Liebherr.
Carrying out / method



- non-contact
- colour in-sensitive
- online & real-time
- useeable in industrial environments
- point/ line recording and traversing in the measuring frame
- different interfaces (Ethernet,…)

- Measuring range moisture content 5g/m²…25.000….50.000g/m², dissolution, 0,5g/m²
- Measuring range coating thickness 5µm…25mm….50mm, dissolution, 0,5µm
- Temperatur < 70°C

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Continous coating control thickness – or weight per area definition

Description
The continious monitoring of coating thickness or-weight per unit area on running webs is in lot of processes a significant factor to assess the quality of products.

We are talking about the precise detection of these parameters on different
Processes under partly extremly conditions.

- The using of a measuring system ensures the quality of products and at the same time the minimizing of product wastes.
- Saftey margins can be omitted.
- Saving of energy and natural resources are becoming more and more important.
- A continuous monitoring creates customer confidence.
- More and more customers e.g. the automotive industry require a complete recording.

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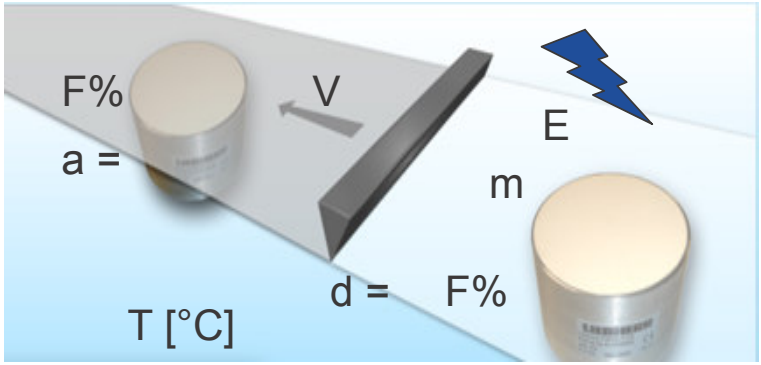
The coating thickness should be measured through an exact measurement of electric capactity with a stray field condencer.

Important influeces are:

- Distance between web and sensor
- Weight per unit of the web
- Moisture content of the web
- Moisture content of the coating
- Web thickness
- Temperature of web and coating
- Fast temperature changes at the sensor
- Electrostatic charges.
- Strong electromagnetic fields (frequency converter)



When all these factors are relatively low, a good measurement is possible.

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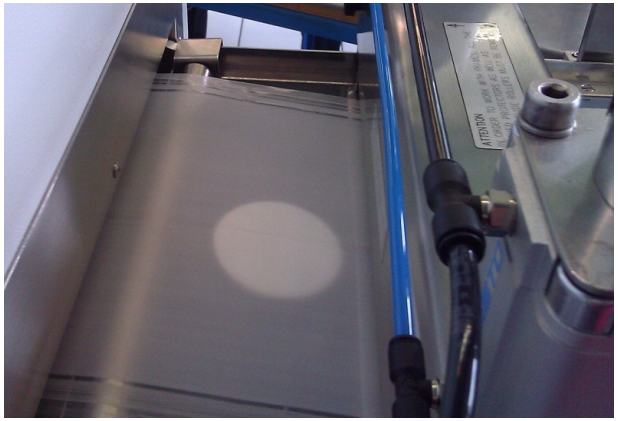
Applications:

- Adhesive coating
- Lacquer/paint coating
- Hotmelt powder coating
- Silicone coating
- Coating thickness
- Material thickness of glass and plastic
- Foil coating
- Polymer coating
- …

Applications



The best solution for each application

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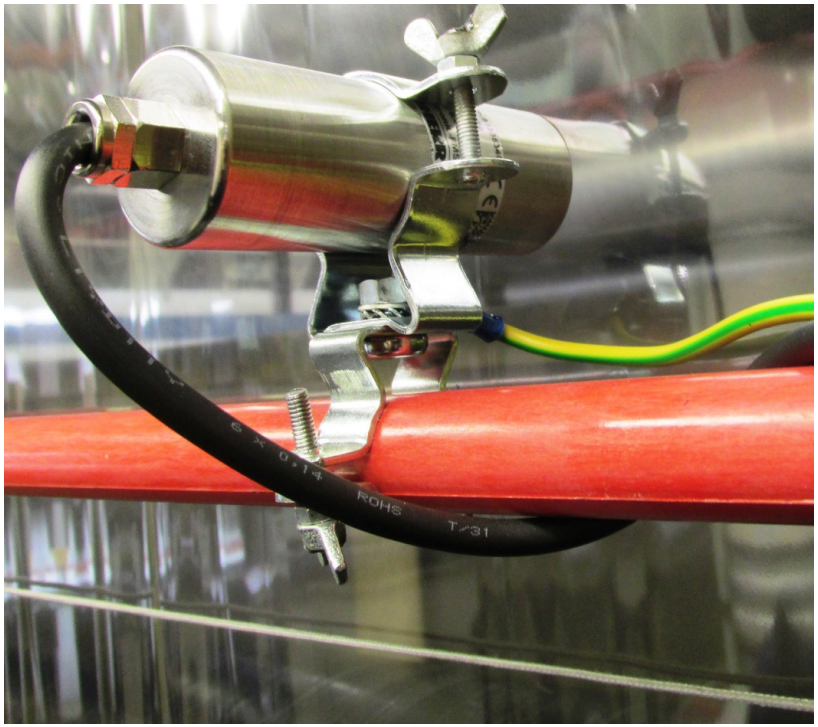
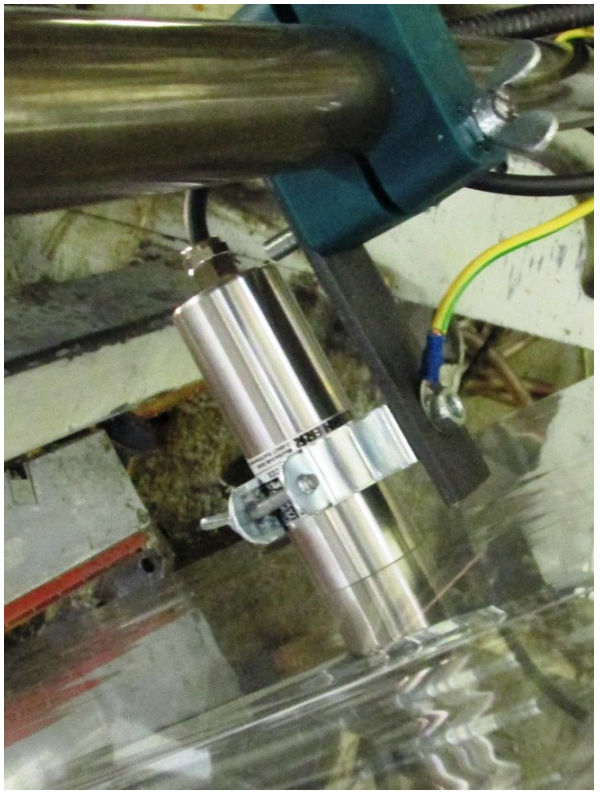
Applications





The best solution for each application

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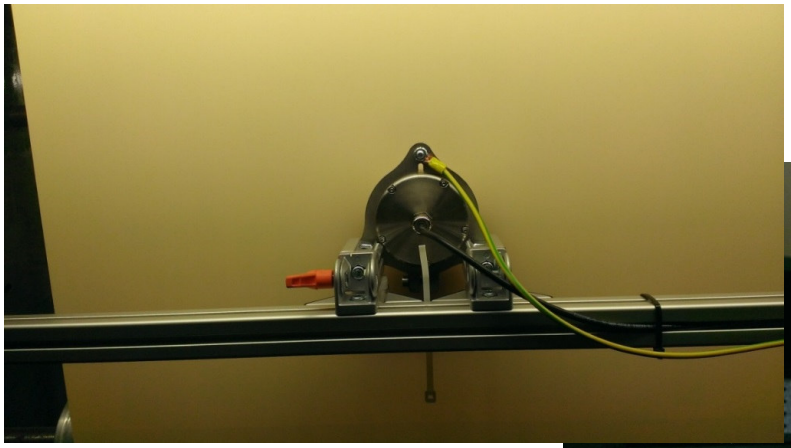
Applications:



The best solution for each application

Applications

The best solution for each application

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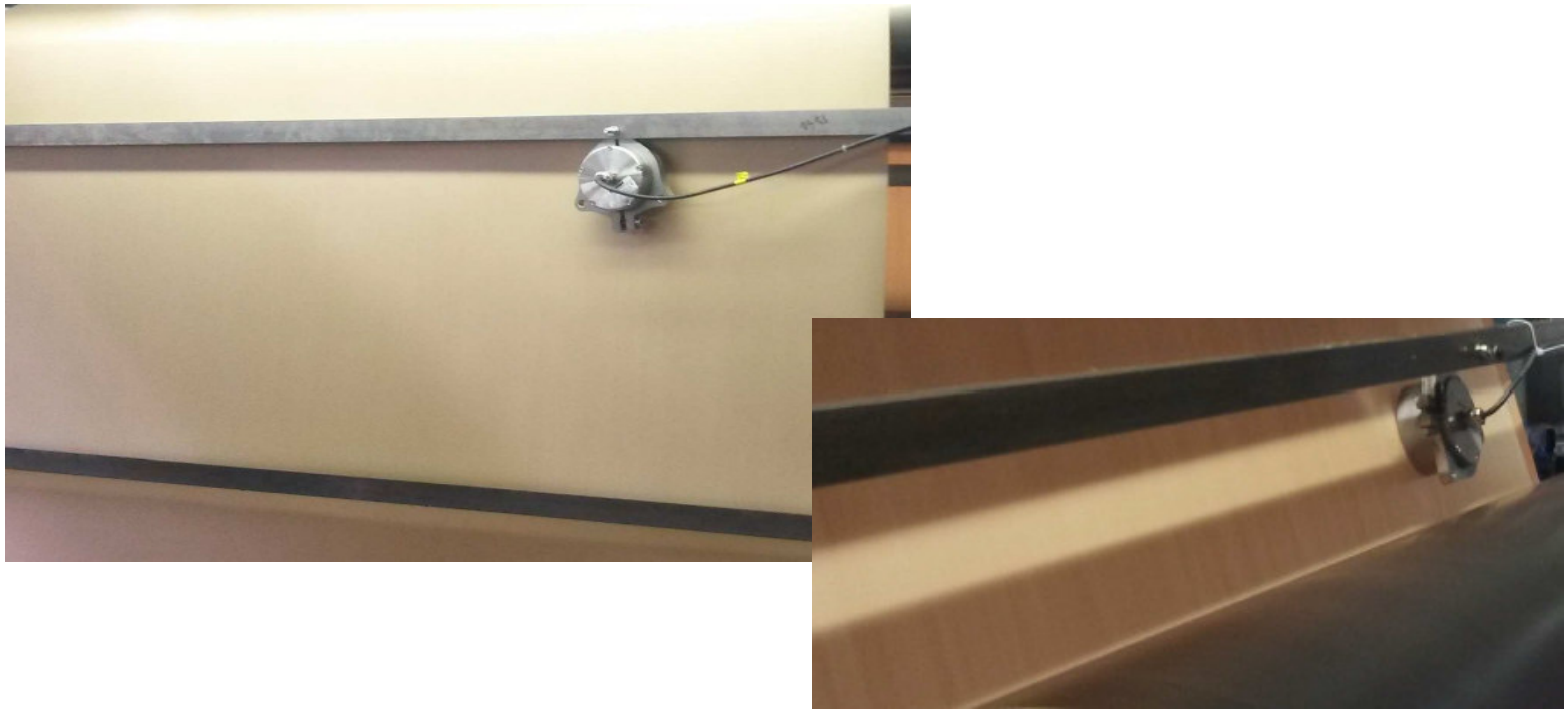
Applications



The best solution for each application

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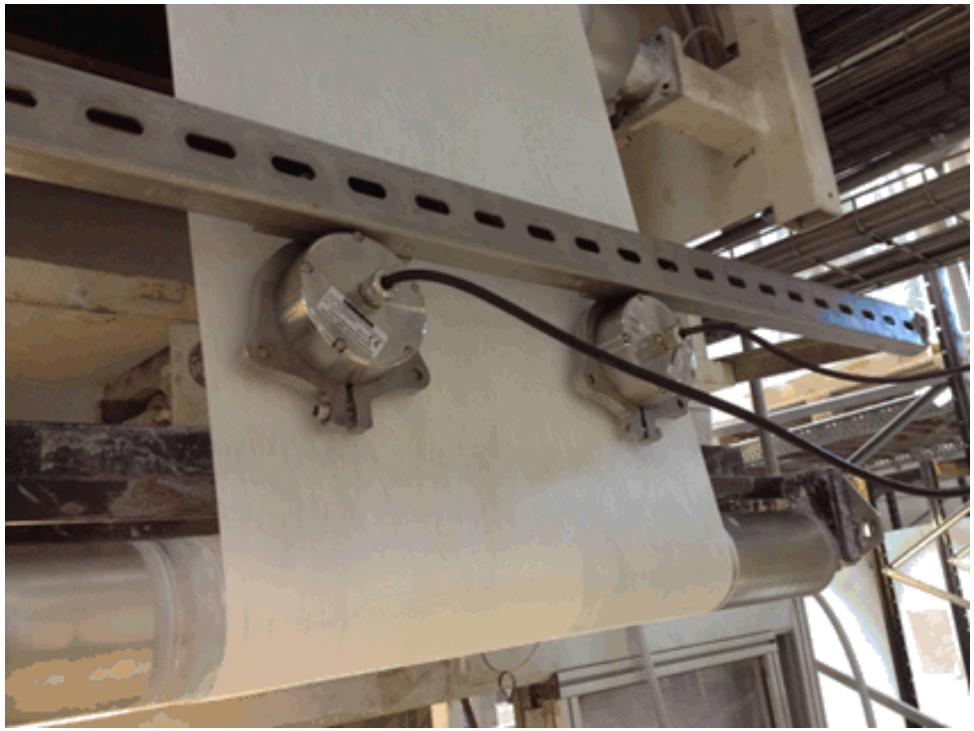
Applications



The best solution for each application

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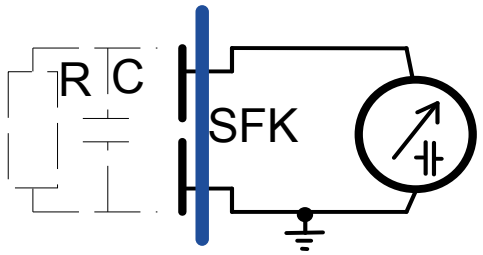
Liebherr Measurement method

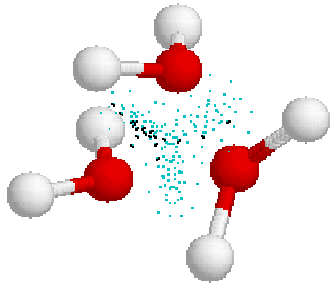
Purely capacitive measurement procedure
The medium to be measured, will be placed separated by an insulating layer of plastic or ceramic, as a so called dielectric in front of the plates of a stray field condenser (SFK).



Permittivity
There is an AC voltage at the SFK-plates, the charge carriers of the medium orientate on the electric field vector and form a polarizing field, which acts against the outer field and weakens this field. As a material property, a factor εr is assigned to the electric field constant ε0 (permittivity of vacuum).

$$\vec{E} = \frac{\vec{D}}{\varepsilon_r \cdot \varepsilon_0}$$

The displacement field D is constant, but the relativ permittivity (εr) is increasing with water contents in the medium. Due to this fact the electric field strength E decreases. Now the field weakening can be detected.



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Thank you very much for your attention!