



Lip gap measurement in the pulp and paper industries

In the industrial production of paper products, a uniform paper thickness is required. The decisive factor here is a constant consistency of the paper webs in the wet end section at the beginning of the production process. A "lip gap" in the headbox, which evenly distributes the very thin pulp/water mixture over the entire width of the machine, controls this consistency. Inductive sensors based on eddy current technology are used for continuous monitoring and control of the gap.

The throughput of the paper mixture is adjusted via the lip opening and must be kept constant over the entire width during operation. Usually the lip gap is between 6 and 25 mm. The measurement task is to continuously monitor the gap between the upper and lower lip as a quality-relevant variable. Therefore, two eddyNCDT EU22 inductive eddy current sensors are mounted on both sides of the upper lip.

Object plates made from steel or aluminum act as measuring surfaces and are attached to the lower lip. The sensor measures the change in distance from the measuring plate on a non-contact basis. The distance signal from the sensor is evaluated in the DT3061 controller and can be transferred as an analog or digital signal via Ethernet to a control system in order to control the outlet gap. The eddy current sensors enable the lip gap and thus the desired paper thickness to be adjusted while the process is running.

The eddyNCDT eddy current sensors from Micro-Epsilon are particularly suitable for integration in machines and systems due to their high resolution and linearity, their extremely high temperature stability and their compact design. They provide precise results independent of the environment. The eddy current principle enables wear-free and non-contact measurements in harsh industrial environments with high temperatures, dust, dirt or pressure.

Requirements for the measurement system

- Measuring range: 22 mm
- Resolution: 1.1 μm
- Linearity: $< \pm 44 \mu\text{m}$
- Temperature stability: $< 3.3 \mu\text{m} / \text{K}$

Ambient conditions

- Temperatures of approx. 60 °C
- Water and oil in the measuring gap
- Aggressive liquids

System design

- Controller: 2 x DT3061
- Sensor: 2 x EU22

Advantages

- Reliable, non-contact and wear-free displacement measurement
- Very high measurement accuracy even with temperature fluctuations
- Various interfaces
- Dirt and oil in the measuring gap do not influence the measurement result

