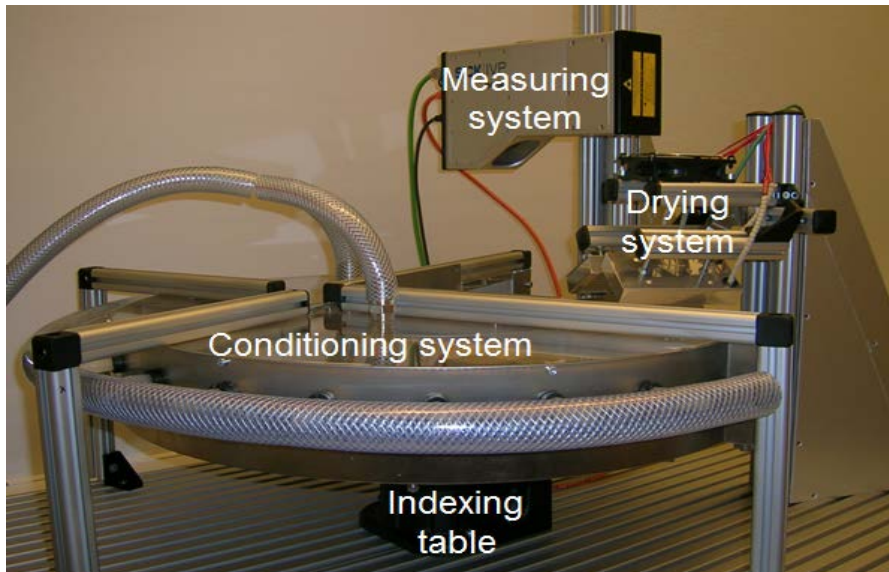


Curl-O-Meter

March 2012

Curl-O-Meter – Measuring out-of-plane dimensional stability of packaging materials

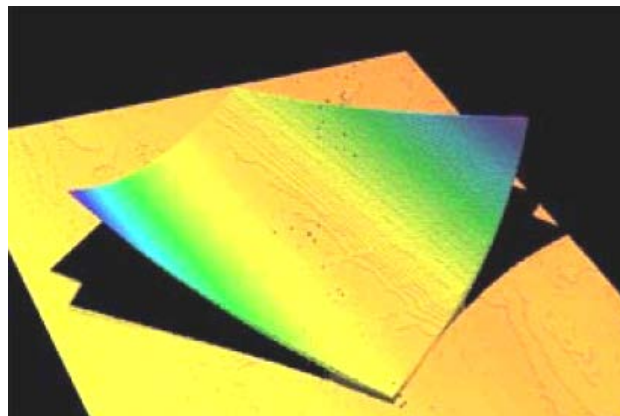
Innventia has developed the Curl-O-Meter, a new instrument for measurement of twist and curl of paperboard and other heavy paper products. The Curl-O-Meter has high levels of automation and minimal need of operator time. The prototype has been tested during two long-term field trials in the quality control laboratories of Scandinavian paperboard mills.



Curl (and of the special type of curl called twist) is a dimensional stability phenomenon that occurs when paper deforms out of its plane. It is due to asymmetries in the structural and physical properties through the thickness of the sample as well as in the interaction with the environment.

Modern measurement technology

The Curl-O-Meter builds on modern measurement technology for shape acquisition. The position of the object surface is determined by triangulation when a laser line is projected on the surface of the sample.



The measurement system compensates for off-set and off-angled positioning of the samples, which increases the accuracy of the measurement and simplifies sample handling. Yet another advantage of using a smart camera is that it can be programmed to measure samples of non-standard size and shape.

Measurement principle

The Curl-O-Meter has two systems to induce out-of-plane deformation of the samples: an IR-dryer and a conditioning chamber. The former induces curl by drying the samples to essentially bone-dry conditions, which is a fast and repeatable way to induce curl. The conditioning chamber can be coupled to an external humid-air generator to provide accurate characterizations of dimensional stability as a function of ambient humidity.

A measurement sequence involving a first measurement at 23°C/50% RH and a measurement in bone-dry conditions can be performed in less than 90 s, when fast response is important for quality control. The automatic sample feeding and ejection units give high sample throughput without need for operator assistance.

Design data

Sample size:	10 cm × 10 cm square (other shapes and dimensions possible)
Number of samples:	5 samples per batch
Grammage:	> 100 g/m ²
Sample conditioning:	humid air and IR-drying
Measurement time:	< 10 min/5 samples (3-point IR-based cycle)
Measurement accuracy:	st.dev. < 0.25 m ⁻¹ .

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