

## Product Information Note

### Experion MX Optical Caliper Measurement



*Experion MX can help improve your business performance in today's challenging economic environment. This fully integrated quality control and process knowledge system provides superior visibility into the papermaking process while it simplifies operational efforts, and is easy and cost effective to maintain and service. Improve paper quality, reduce raw material, energy and maintenance costs, and increase production efficiency with a package of solutions that provides the lowest total lifecycle cost available.*

#### Product Brief

The Optical Caliper uses a sophisticated sheet stabilization system with patented<sup>1</sup> features to capture the sheet edge for full off-sheet, edge-to-edge scanning. It is an alternative to contact-style caliper measurement for on-line scanning Experion MX Quality Control Systems (QCS) and is suitable for a variety of paper grades including newsprint, recycled, well coated and some board grades.

With the sheet held at an ideal reference surface, the state-of-the-art laser triangulation distance device and high-frequency Z-sensor measures the thickness of the sheet, providing accurate and repeatable measurements with no damage to the sheet.



Two models of the Experion MX Optical Caliper Measurement are available: Model Q4213-52 for Experion MX QCS and Model Q4213-02, for use on Da Vinci QCS.

#### Features and Benefits

- Full edge-to-edge, optical scanning of the sheet provides accurate measurements of sheet thickness.
- Sheet stabilizer with patented dual-opposing coanda air slots to capture the edge when coming on sheet. The sheet is held wrinkle and flutter free through the scan with sophisticated vacuum inlet designs.
- Greater sheet edge stabilization gives the opportunity to measure and control more edges, reducing the need to manually override controls.
- Calibrations can be performed without the need to shut down the machine or remove the sensor from the scanner. Automatic standardization ensures long-term measurement accuracy.
- Robustness of the sensor ensures continuous, trouble-free operation without clogging, even in hostile environments.
- CMOS laser triangulation technology is unaffected by surface texture, color or stray light providing precise measurements of thickness.

#### Description

Optical Caliper Measurement is suited for paper grades where the use of pinching contact measurement has been problematic. It is particularly well suited to caliper measurement for use by newsprint, filled-sheets, and recycled-sheet producers.

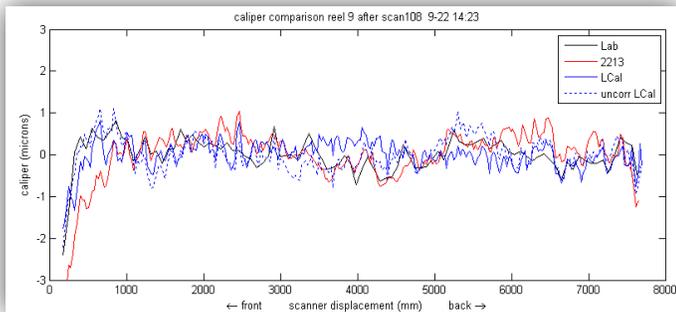
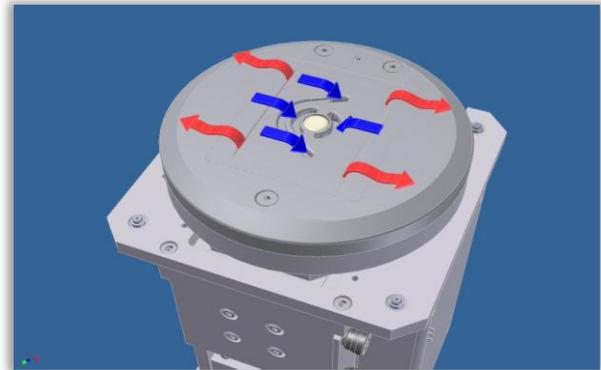
Combined with a two stage sheet stabilizer design for off-sheet scanning and laser triangulation, Optical Caliper Measurement provides full edge-to-edge measurement of caliper.

<sup>1</sup> Patents US6,936,137, US7,892,399, US8,083,896, and other patents pending.

The capability of Optical Caliper Measurement rests with the ability to stabilize a sheet and achieve reliable measurement using the sheet stabilizer. The first stage captures the sheet with coanda slots on edge reentry. The second stage gently holds the sheet and smoothes the wrinkles for presentation to the laser measurement through the scanning traverse.

The Optical Caliper Measurement uses a sliding concept for caliper measurement, where one side of the sheet is measured by the laser, while the underside of the sheet is captured by a reference surface. The single laser triangulation measurement device is simple. Accuracy and repeatability are comparable to contacting-type caliper sensors and one cannot tell the difference in performance between lab, contacting caliper, or Optical Caliper.

reflection response. This picture has a variety of information to produce a noise free measurement of distance and is robust to stray light and scatter.



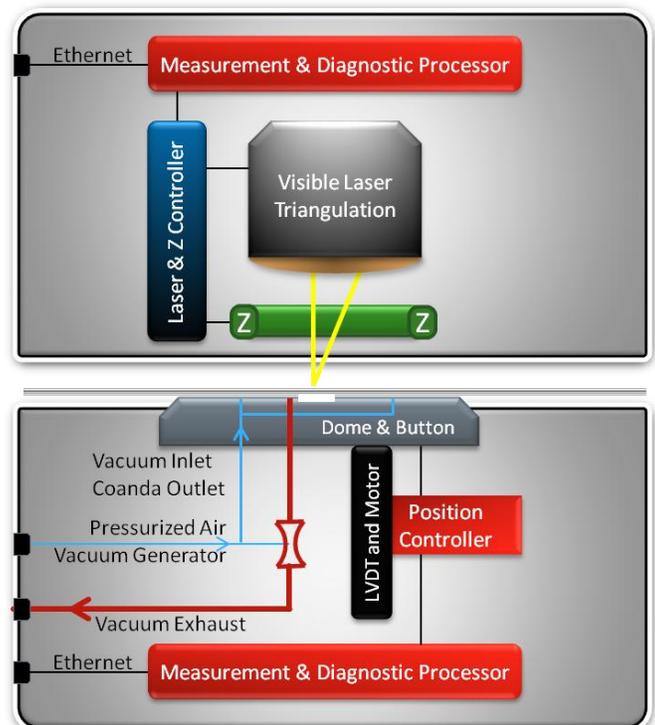
A distance measurement (Z) built into the body of the sensor is purpose-built to match the resolution of the laser triangulation system. The combination of the reference surface, the distance measurement and the Z distance results in a caliper measurement of the paper. Additional sophisticated devices are embedded into the sensor to support its calibration and standardization without the need to remove it from operation, making it easy to service and maintain.

### Principle of Operation

Using a sophisticated sheet stabilizer, the sheet is captured as the scanner scans freely on and off sheet. The sheet is stabilized and smoothly presented to the CMOS laser triangulation system, which is unaffected by surface texture, color or stray light. This results in a sheet that is free to glide over a reference surface, for precise caliper measurement. The glide is unrestrained and without pinching forces, to avoid damage to the paper and the measurement device itself.

The sheet is captured to a reference surface by coanda air outlets when coming on-sheet. These outlets are slots that aerodynamically capture the sheet when the scanner head is coming on-sheet. Once captured within range, a vacuum inlet holds the sheet, without flutter, over a wear resistant ceramic button.

The wrinkle-free captured sheet is measured by the laser, and the reflection is detected by a triangulation imaging device. CMOS detection technology is used to obtain a 'picture' of the



## Specifications: Experion MX Optical Caliper Measurement - Model Q4213-52; Q4213-02

Category	Optical Caliper Model Q4213-52 (EDAQ2) & Model Q4213-02 (non-EDAQ)
Measurement range	45 - 1000 microns. Contact Product Marketing for lighter sheets. Tissue and towel grades excluded.
Repeatability, $2\sigma$	<0.3 $\mu\text{m}$ for range of integration times between 0.05 to 16 seconds, on calibration sample.
Profile Accuracy, $2\sigma$ (Relative Accuracy)	1 percent of reading or 1.0 $\mu\text{m}$ , whichever is greater.
Measurement area, CD	Available minimum bin width: Software averaged to TAPPI T 411:
Maximum ambient conditions	Sensor is protected by Scanner head. Following conditions are restated from scanner specifications <ul style="list-style-type: none"> <li>• 93°C (200°F) external temperature*</li> <li>• 100°C (212°F) sheet temperature*</li> <li>• 10-95% RH, non-condensing</li> </ul> * Sensor must be mounted in a temperature-controlled enclosure.
Laser System Safety	Visible light laser. Integrated with scanner as Class I (cannot emit laser radiation at known hazard levels); in accordance with US FDA Regulations, Title 21 of the Code of Federal Regulations

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<sup>2</sup> EDAQ – Data Acquisition with Ethernet-based communication

**For More Information**

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