Lumetrics® is the leader in flat glass and tubing measurement. Since 2003 Lumetrics® has worked with all of the leading glass manufacturers in the world in the measurement of their specialty glass products. Lumetrics®’ systems measure float glass and coatings at the hot end and even in a tin bath. They measure water glass and other multilayer products like safety glass without contact and non-destructively. Lumetrics® OptiGauge™ technology measures tubing of various sizes both on line and in the lab. Our technology is even used for in-process glass slimming measurements. These glass slimming applications use hydrofluoric acid, an extremely dangerous process. The data provided by the OptiGauge™ can be used to increase a customer’s throughput by over 30% due to process improvements. This document will explore the many ways an integrated OptiGauge™ system can improve in-process measurement in glass production, and create significant revenue improvements.

**Float Glass**

Lumetrics® systems provide real-time, accurate, online measurements for float glass lines. Measuring glass both in the tin bath and just outside on the hot end is critical to plant efficiency because it allows for the fastest feedback to the plant operators. Lumetrics® can position their OptiGauge™ system thousands of feet away from the oven and run fiber optic cables to the probe or probes doing the measurement at the line. Up to 8 probes can be connected to a single OptiGauge™ for any configuration need.

The probe is the size of a magic marker and can be mounted in a fixed location or on a scanner. Some customers have mounted multiple probes within a cooled chamber located in the tin bath itself. In other installations the probes are located on scanners right outside the bath, but still in the hot area. Heat and ambient light do not affect the operation of the system or its accuracy.

With an accuracy of .1 microns (0.000004”) the OptiGauge™ provides users with the ability to track their production and bring glass thickness tolerances to unprecedented levels. One plant is saving 2% on raw materials by being able to consistently operate at the lower edge of a tolerance range. Plants using Lumetrics® equipment are saving hundreds of thousands to millions per year by fine-tuning their lines. The OptiGauge™ helps plants bring lines up to specification faster and keep them there. The systems are also easy to set up with very little alignment needed. Rapid setup, easy operation, and reliable results make the OptiGauge™ the choice among online users.

Additionally, the OptiGauge™ is ideally suited for off line inspection of finished or in-process products. Customers are using the OptiGauge™ with scanners and manual fixtures to test thickness variability, coating thickness, multi-layer structures, and other features of their glass while in the production process. Coated glass, water glass, multi-layer composites – the OptiGauge™ can measure any thickness from 0.025mm – 35mm.
Glass Slimming

Lumetrics provides specialized OptiGauge™ systems to manufacturers who use hydrofluoric glass slimming operations. A specially coated probe is inserted into the chamber in an alignment system that keeps the probe perpendicular to the glass being treated. Customers have many advantages by measuring the glass in situ.

Processes can be monitored in real-time allowing the customer to reduce the risk to personnel and the product that can occur with traditional operations. Today a slimming system would be shut down part way through the process, a measurement taken, calculations performed, and then the glass reinserted and process started up again for a pre-determined time.

This start – stop process takes time and subjects operators to the risks of hydrofluoric acid leaks and injury. Operators have estimated that the in-process OptiGauge™ system saves them 30% in production time, while reducing risk!
Glass Tubing

The OptiGauge™ reduces variability and improves yields in the production of Glass tubing. Using an online multi-probe fixture, customers are able to track wall thickness, ID, OD, concentricity, ovality, and other variables while the tubing is being extruded. These measurements are fed back to the control system for rapid real-time adjustment of the process. Whether it is capillary tubing, or fluorescent lights, or anything in between, the OptiGauge™ provides the accuracy that is needed to increase quality while reducing scrap and improving yields.

4 probe online tubing fixture.

Glass Ampoules

Lumetrics® provides thickness measurement for a variety of glass tubing manufacturers including ampoules and tube manufacturers. These companies may be the tubing provider or they may be the end user. The reasons for needing an OptiGauge™ are many and range from incoming inspection of preliminary tubing to measurement of the ampoules after they’ve been sealed. Many of these customers are in the medical market and their needs may center on quality as well as scrap and throughput.

Traditional testing techniques center on drop tests to check for weakness and breakage but these tests are crude and inaccurate. Many other tests are strictly destructive and subjective. Breaking open ampoules and then trying to measure corners with micrometers, magnetic current testing, and other methods are used by industry today.
Lumetrics®’ OptiGauge™ combined with customized fixturing can provide a manufacturer with the tools to monitor in-process thicknesses on incoming inspection of tubes, and can also provide real time thickness measurement of multiple ampoules while they are being made and sealed. Lumetrics®’ OptiGauge™ directs an infrared light beam at any location on the tube and is able to determine thickness. Obtaining 200 samples a second allows the OptiGauge™ to measure multiple ampoules while they are spinning and obtain thickness measurements around the dome of the ampoule at any angle. This same system can be used to measure tube walls before the ampoule is sealed.

Auto and Architectural Glass

One of the most prolific uses of glass is in Architecture and Automotive products. Many of these are composites of glass and some sort of polymer. One of the problems companies have experienced over the years is how to determine whether there are air pockets or gaps between the layers. This makes them unstable and subject to catastrophic failure. Additionally, some functionality, such as the use of heads-up display, requires specific dimensional forms in the polymer.

Lumetrics® has been working with glass and polymer companies over the last 10 years to identify and solve various issues associated with glass and polymer bonding. With a simple hand held device and gathering data at 200 samples per second an operator can scan a sample and determine any voids or defects. Combine this same probe with a robotic arm and a CAD drawing and any piece can be examined and mapped in seconds. The OptiGauge™ systems are in use on the production line, in QA facilities, and in R&D centers solving problems every day.
Optics and Glass Flats

Optics and glass flats of most any size and shape can be measured by the OptiGauge™. Lumetrics® provides fixturing for typical optical components and then, if needed teams with other mechanical design teams to produce a system tailored to a customer’s design. Lumetrics® first customer was Corning Tropel and their system was designed to measure the air gaps on multi-lens stacks. Corning Tropel and Lumetrics® presented a joint paper that discussed the accuracy and repeatability of the OptiGauge™ as well as its method to ensure the accuracy of each system before it leaves the factory floor.

Some of the various fixturing solutions are shown below.
Now offering CLAS, ClearWave & CrystalWave product lines acquired from AMO WaveFront Sciences!

Silicon / glass bonded wafer scanner

Precision glass scanner

For more information on these and other glass applications contact us at sales@lumetrics.com.