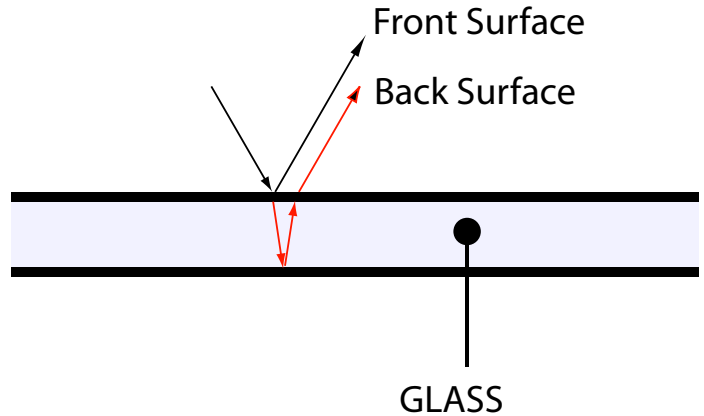


Glass Thickness Measurements

Background

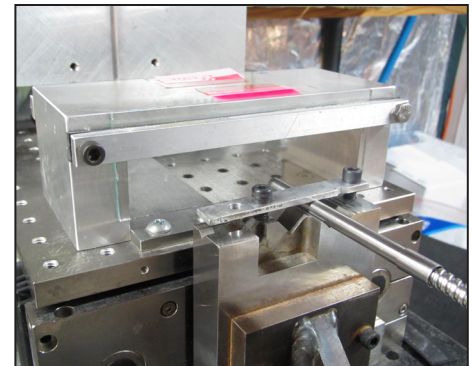
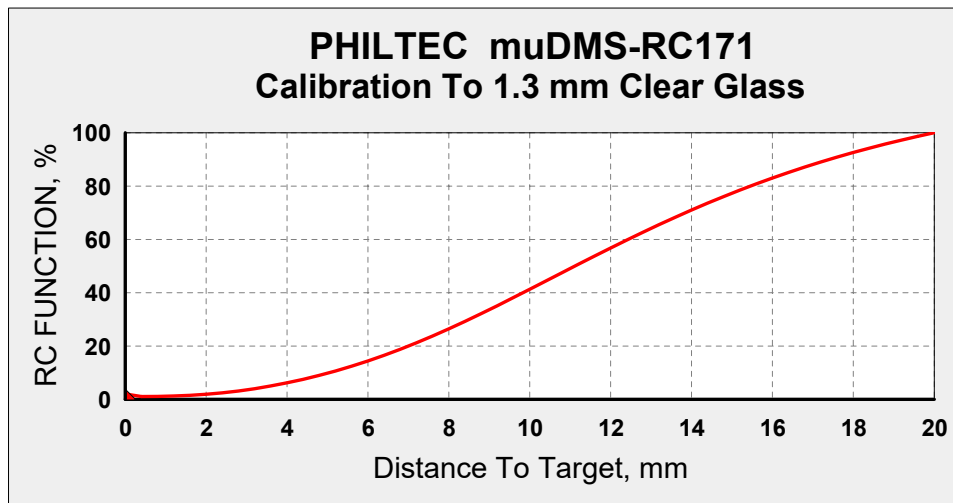
With light based sensors, light rays will reflect off the front and the back surfaces of clear glass. The thickness of clear glass can be measured by using two sensors, with one mounted on each side of the glass. There are some guidelines that must be followed:

- Gap Calibrations to glass of the same thickness must first be made and stored in the sensor
- Probe heads must be offset from each other to avoid interference
- Besides the glass to be measured, there must be nothing reflective in line with each probe



Sensors

Philtec's USB digital sensors model muDMS-RC171 (with ambient light rejection) are used for this measurement example. Glass samples are calibrated with a 20 mm operating range. For the calibrations, the samples were mounted in a holding fixture placed on a linear stage table with clear space behind. Probe heads were fixtured at 90° to the glass samples. A typical calibration chart is shown here. When gapped between 8 - 14 mm, the sensors are in their optimum range of operation.



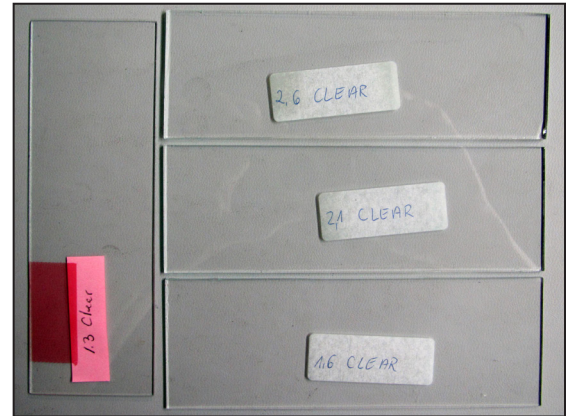
Calibration Stage

Glass Thickness Measurements

Clear Glass Samples

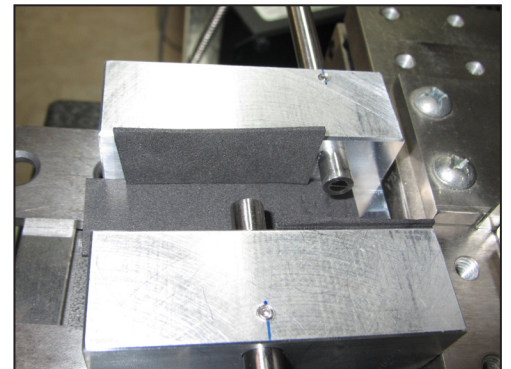
Four glass samples 50 x 150 mm were used:

- 1.3 mm clear
- 1.6 mm clear
- 2.1 mm clear
- 2.6 mm clear



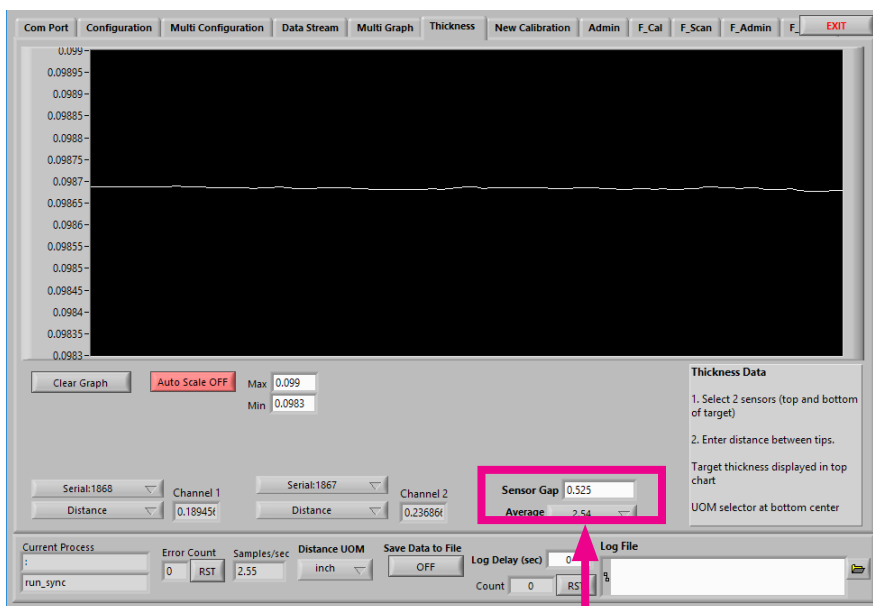
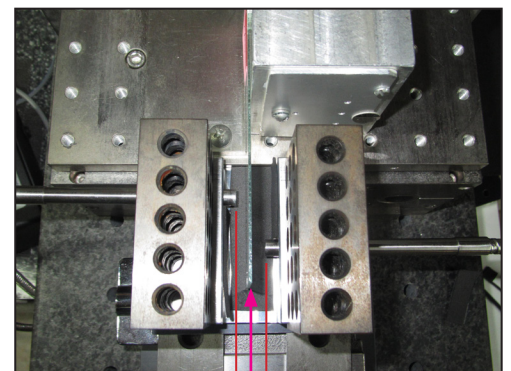
Sensor Holding Fixture

A U shaped aluminum block was used to mount the probes. To avoid light interference, the probes were offset from each other and the aluminum surfaces were coated with unreflective black material as shown here.



Thickness Measurements

The gap between the two probe heads was precisely measured to be 0.525" (13.335 mm). That value was entered as shown below. The glass samples were centered between the probe heads and thickness measurements recorded using Philtec's thickness software.



Sensor Gap 0.525" Entered Here

13.335 mm
Glass Sample

Glass Thickness Measurements

Results

Nominal Thickness mm	Actual Thickness mm	Measured Thickness mm	Error, mm
1.3	1.21	1.24	0.03
1.6	1.56	1.48	0.08
2.1	2.07	2.02	0.05
2.6	2.51	2.47	0.04

The glass thickness measurements were made to an accuracy level of < 0.1 mm.

Discussion

The achievable accuracy of this measurement is dependent upon several items:

1. Setting and measuring the sensor head gaps with high precision
2. Maintaining perpendicularity of the probes to the targets
3. Avoiding any extraneous reflections that can interfere with the sensor inputs
4. Glass should be fingerprint and dust free

Dual Channel Sensors

Two single channel sensors were used for these measurements. For production applications with fast moving glass, simultaneous sensor readings are required for best accuracy. Philtec's dual channel 2DMS-RC171 sensor is recommended. The 2DMS sensor readings are synchronous and they have capacity for storing up to 12 different calibration tables.

