

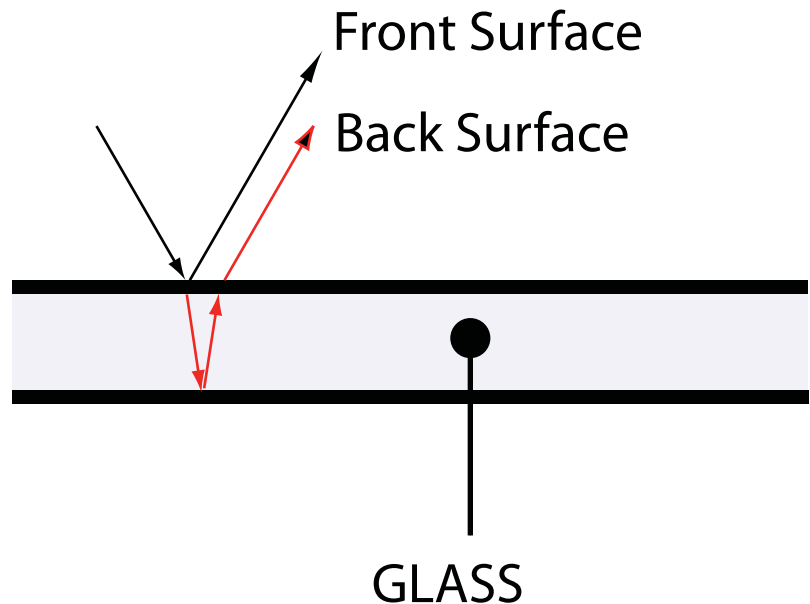
Transparent Parts Measurements

The Problem

To measure the distance to or shape of transparent targets using non-contact fiberoptic sensors.

Two reflected signals are returned to a fiberoptic sensor from transparent targets. With clear parts, the two reflected signals are approximately of equal strength.

Distance and Shape. Where thickness of the parts are constant, such as in the production of building windows, automotive windows, TV screens and many other consumer products, the distance to or shape of the parts can be accurately inspected and gaged using fiberoptic sensors.



Note For Thickness. With the distance to the top and bottom surfaces generally both unknowns, Philtec's fiberoptic sensors can not be used to measure thickness of clear materials because the top and bottom reflections are of unknown intensity and their combined reflected intensity can not be separated into the individual component parts.

The Solution

The distance to transparent materials can be accurately measured and the shape of parts inspected for conformance to a master shape if the sensor has been calibrated to a piece of material of the *same type and thickness*. This is absolutely required for clear parts.

In the case of tinted or colored parts, the back side reflection intensity is significantly reduced, virtually eliminating the reflection from the back side. Test results show that Philtec's RC type sensors respond to tinted glass with nearly the same sensitivity as a front surface mirror.

Test Results

8 pieces of glass ranging from clear to very dark tinted were calibrated using Philtec's model RC171 sensor. The results are shown below along with a calibration to a front surface mirror.

The clear glass reflects strong signals from the front and back surfaces. This effect is seen in the calibration data where it is significantly higher than all the other calibrations.

All the tinted glass samples respond much like a front surface mirror, which means the tint in the glass has the effect of suppressing the back side reflection. This result leads to the following conclusions:

- Measurements to tinted glass are insensitive to thickness variations
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- One calibration to a tinted glass can be used for any tinted glass at any thickness

