

Coating Geometry Measurement Method



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Optical
Fiber

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Scope

This information describes the current reference method for measuring the coating geometry of Corning® optical fibers.

General

Coating outside diameter and coating concentricity error (offset) are measured off-line using the Ray-Traced Side View Method. The boundaries with the cladding can be determined from a diffraction pattern created when a laser scans the transparent protective coating. The coated fiber is modeled as a series of nearly concentric cylinders through which ray traces are performed, yielding a set of equations which are then solved for center and diameter of each layer.

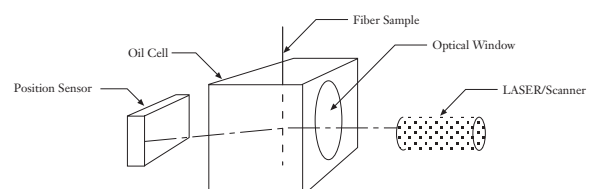
Measurement Description

Fiber sample is inserted in a series of dies suspended in index matching oil.

A focused laser scans across the sample and the defracted rays strike a detector array that accurately measures the position of the incident beam (see Fig. 1). Detector output is digitized and trace peaks are determined. Peak location corresponds to a surface boundary (see Fig. 2). The sample is rotated about its axis a few degrees and the scan is repeated. After several iterations the collected data is processed. Equations derived from Snell's Law and which describe a ray refracting through several cylindrical boundaries, are used to find the center point and best fit circle for each layer. The concentricity error is then calculated by the vector sum of all intervening layers' center offsets.

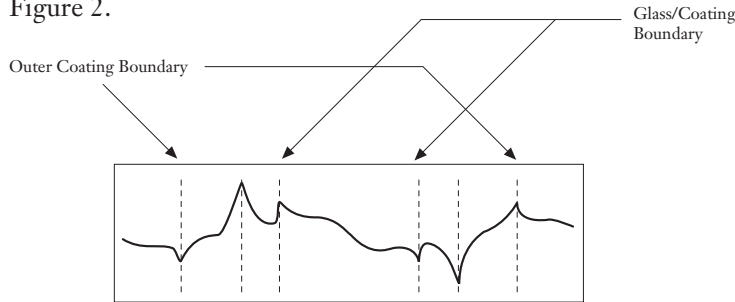
Typical Apparatus Setup

Figure 1.



Typical Deflection Function

Figure 2.



Measurement Conditions

- Sample length: 20 cm
- Sample holder: Oil cell w/windows and precisely drilled drilled dies supporting a fiber suspended in the center
- Index matching fluid: Immersion oil

Apparatus

Corning Incorporated designed optical measurement system.

References

EIA-FOTP-163, (proposed) Coating Geometry Measurement for Optical Fiber Ray-Traced Side View Method

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