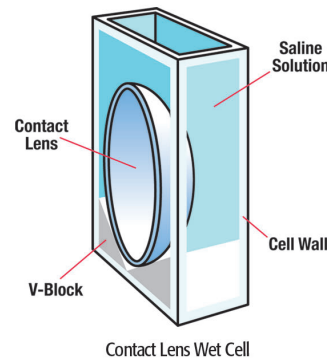
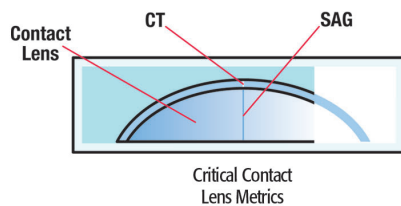
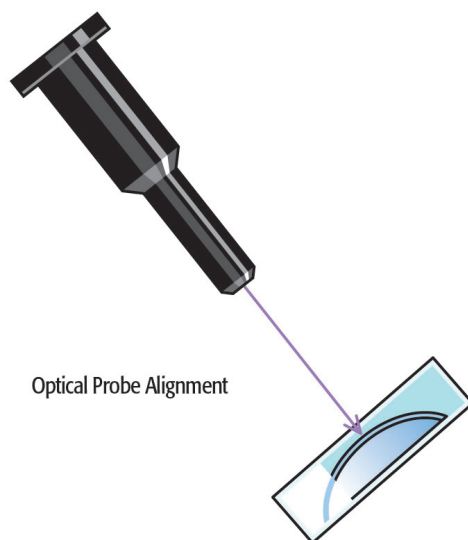


Contact Lens Metrology with the 157 Series Optical Thickness Gauge

The 157 Optical Thickness Gauge is ideal for the non-contact metrology of ophthalmic products such as a contact lens. This instrument measures absolute thickness to an accuracy of $\pm 0.1 \mu\text{m}$, which is guaranteed over long periods of time by continuously referencing the measurement to a built-in HeNe laser that has a wavelength recognized as a standard of length by NIST. In addition, the system's measurement repeatability is as high as $\pm 0.02 \mu\text{m}$. Therefore, the 157 system is the most precise way to measure the important parameters of central thickness (CT) and sagittal height (SAG). What's more, the 157 system is sensitive enough to perform these measurements while the contact lens is fully hydrated in a wet cell filled with saline solution.



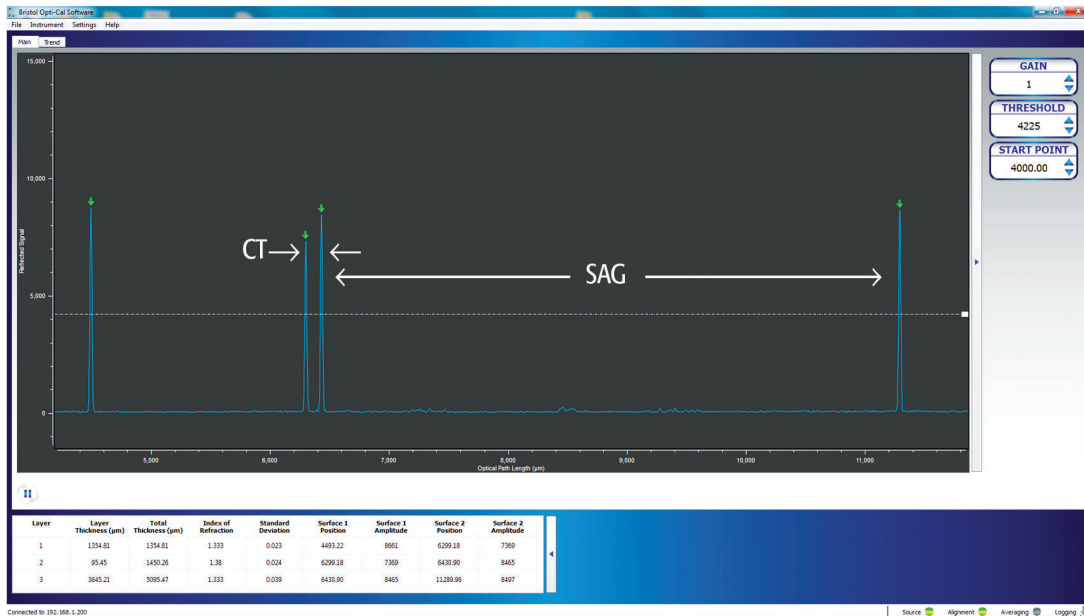
The model 157 was used to measure CT and SAG of a contact lens that is in a hydrated state. The wet cell was tilted slightly to ensure that the contact lens stayed in place. The system's optical probe for the model 157 was aligned to the optical axis of the contact lens as shown in the following figure.



Light from the 157 Optical Thickness Gauge is sent through a fiber to the optical probe and then to the contact lens through the wet cell. Reflections from every surface are collected and returned to the 157 system for analysis. A screenshot of the display software while measuring a contact lens in the wet cell is given on the following page. Four surface peaks are detected corresponding to the two inner cell walls, the contact lens posterior surface, and the contact lens anterior surface.

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The relevant thickness measurements are labeled on the corresponding peaks shown on the display software. The quantitative measurements given are for the CT (Layer 2) and SAG (Layer 3), and are 95.45 μm and 3645.21 μm respectively. The uncertainty of these values is $\pm 0.1 \mu\text{m}$.



The following graph demonstrates the stability of the measurements provided by the 157 Optical Thickness Gauge. Center thickness values over a time period of 5 minutes with no averages are shown. The standard deviation of these measurements is $\pm 0.027 \mu\text{m}$. Such exceptional stability is one of the reasons why the 157 Series Optical Thickness Gauge provides the most reliable thickness measurement available, resulting in greater confidence in your test results. What's more, averaging was not used to enhance the demonstrated measurement repeatability.

