



*Thin Film Measurement solution  
Software, sensors, custom development  
and integration*

## **AUTOMOTIVE HEAD/REAR LAMP APPLICATIONS**

There are several points in automotive head/rear lamps manufacturing process where coating thickness can be critical and requires quality control: outer hardcoat layers (scratch-resistant), inner anti-fog layers for polycarbonate lenses, hardcoat on base reflector plates, hardcoating on bumper covers and many other components.. Each of these coatings presents a unique set of measurement challenges: low optical contrast between polycarbonate and coating material, inter-penetration/interface layer, colored parts (e.g. red), reflective texture on the part surface, etc.

MProbe VisHC system provides robust and easy to use solution that allows to measure layers directly on the product. Manual probe MP-FLVis is connected to system with a flexible fiberoptics cable. The probe conforms to the curvature of the sample and accurate measurement can be performed easily. It is used for measurement of the parts larger than 1" (25mm). Small measurement spot (<200  $\mu\text{m}$ ) reduces the effect of backside reflectance. MProbe VisHC software uses advanced Thick Film algorithm for HC films and curve fitting algorithm for anti-fog coatings. Algorithms can be easily adjusted/trained to measure even most challenging samples. Measurement process is easy for inexperienced operator to use and understand.

Coating lab operator can quickly and easily measure parts right after removal from the coating system.

Below are some of the examples of typical measurements

# I Hardcoating: Bumpers cover coating measurement

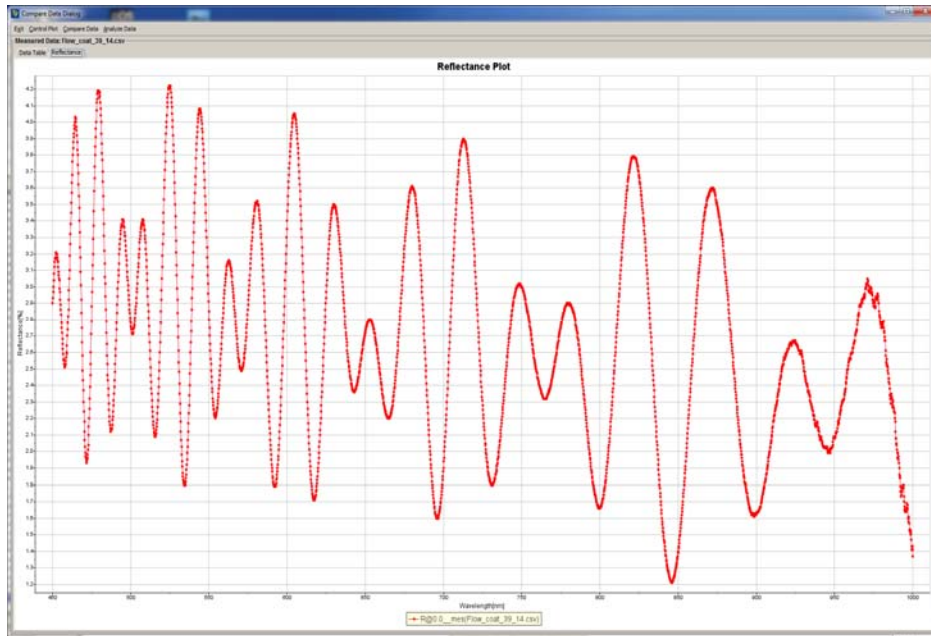


Fig. 1a Bumper cover: Measured raw reflectance spectrum

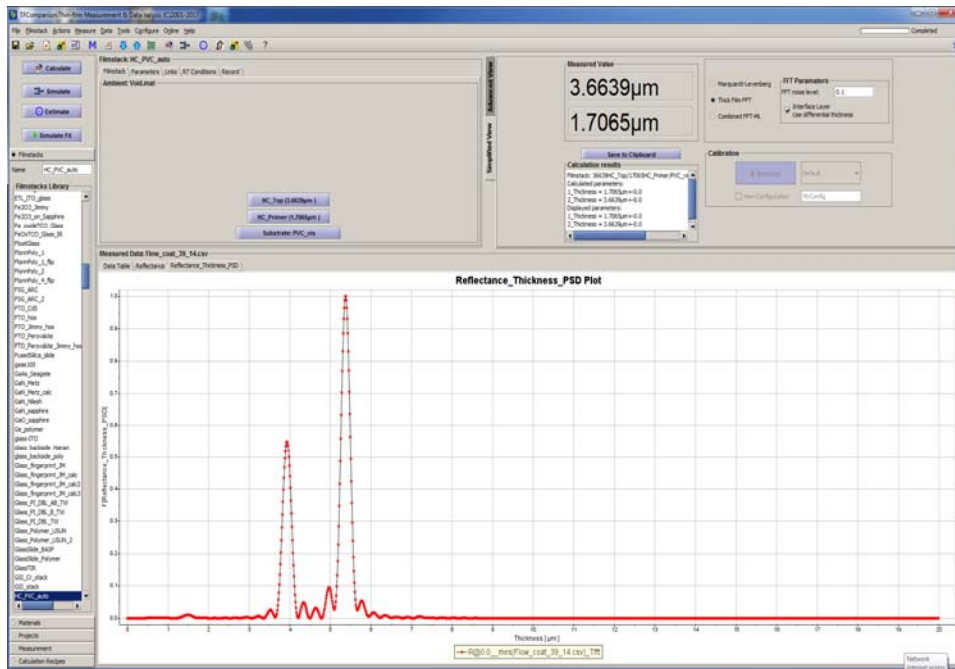
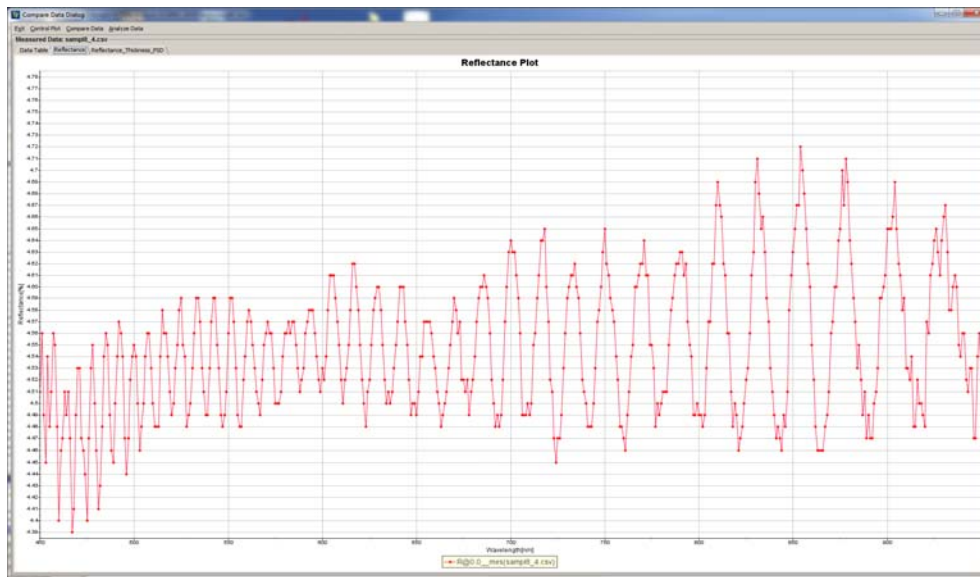
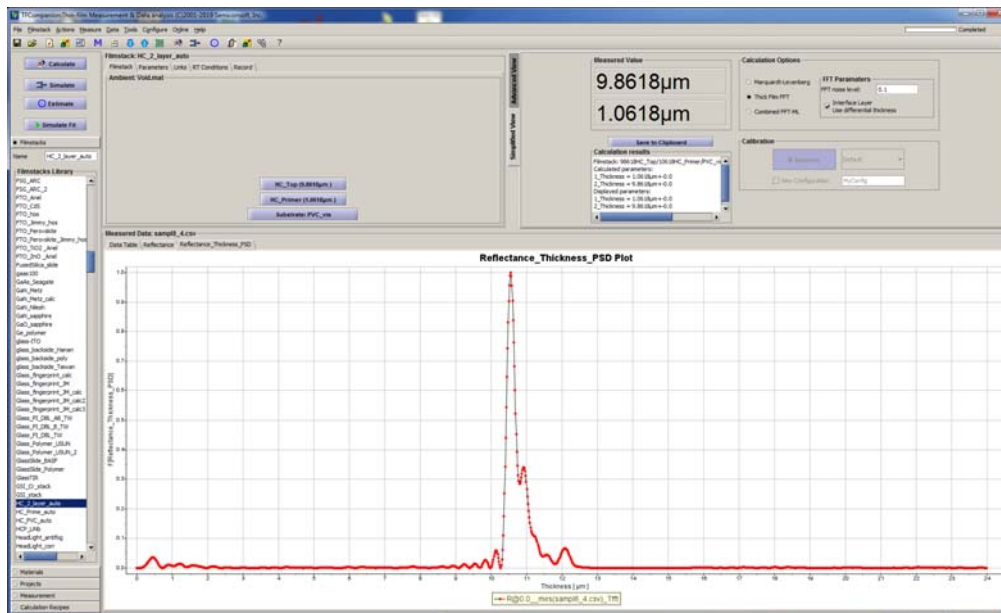


Fig. 1b Bumper cover: Measurement results. Both polymer and hardcoat layer thicknesses are determined

## II. Hardcoating: Headlights covers

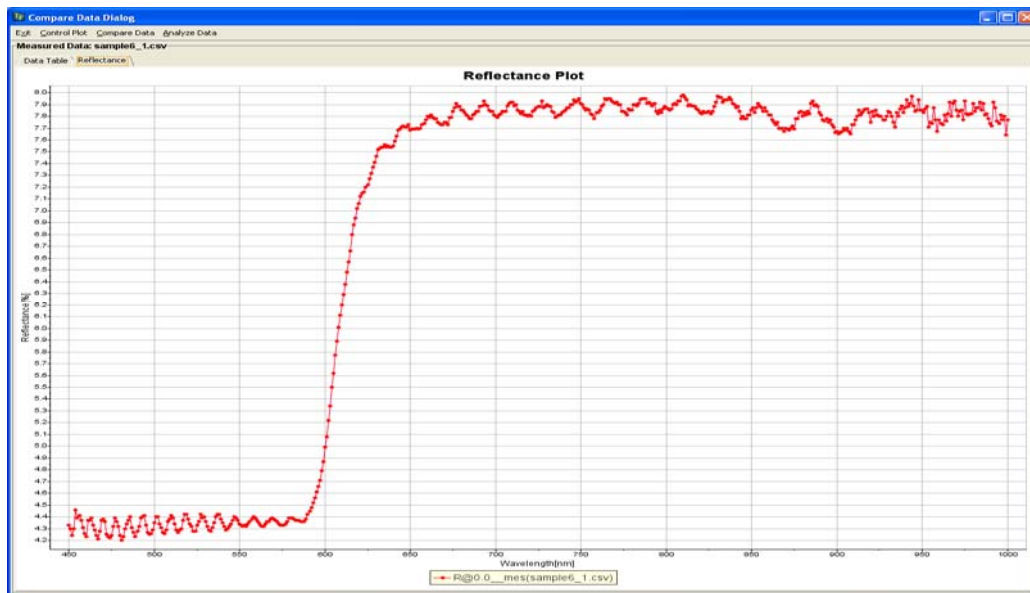


**Fig. 2a** Clear headlight with hardcoat: raw reflectance spectra measurement.

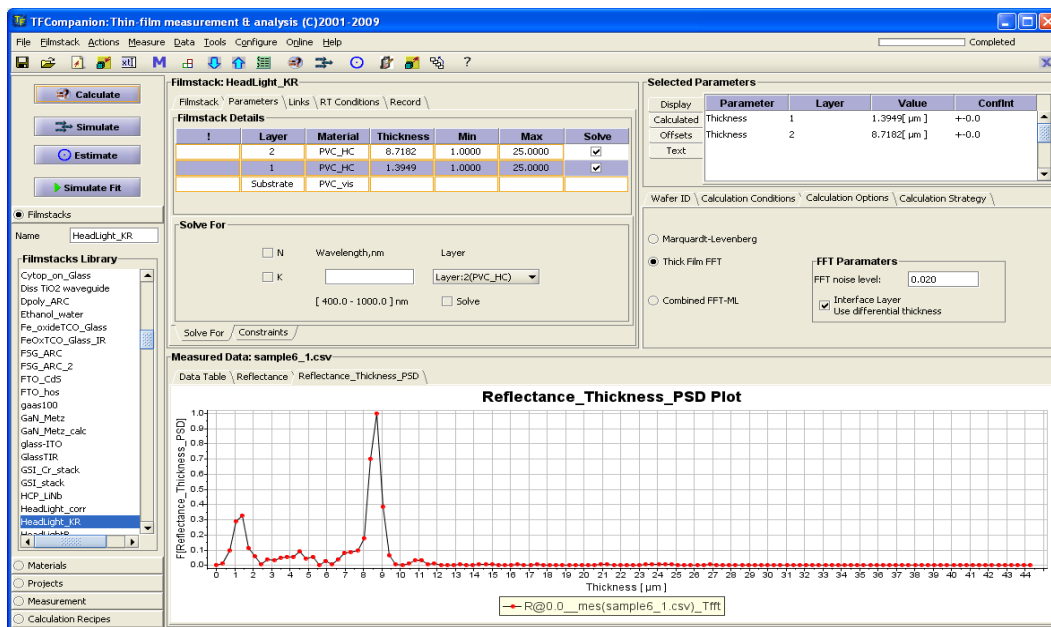


**Fig. 2b** Results of the measurement of clear headlight with hardcoat. Hardcoat thickness- 9.86 μm; primer thickness - 1.06 μm (First peak corresponds to hardcoat layer; second peak corresponds to the total thickness hardcoat+primer)

### III. Hardcoating: Taillight (red) covers



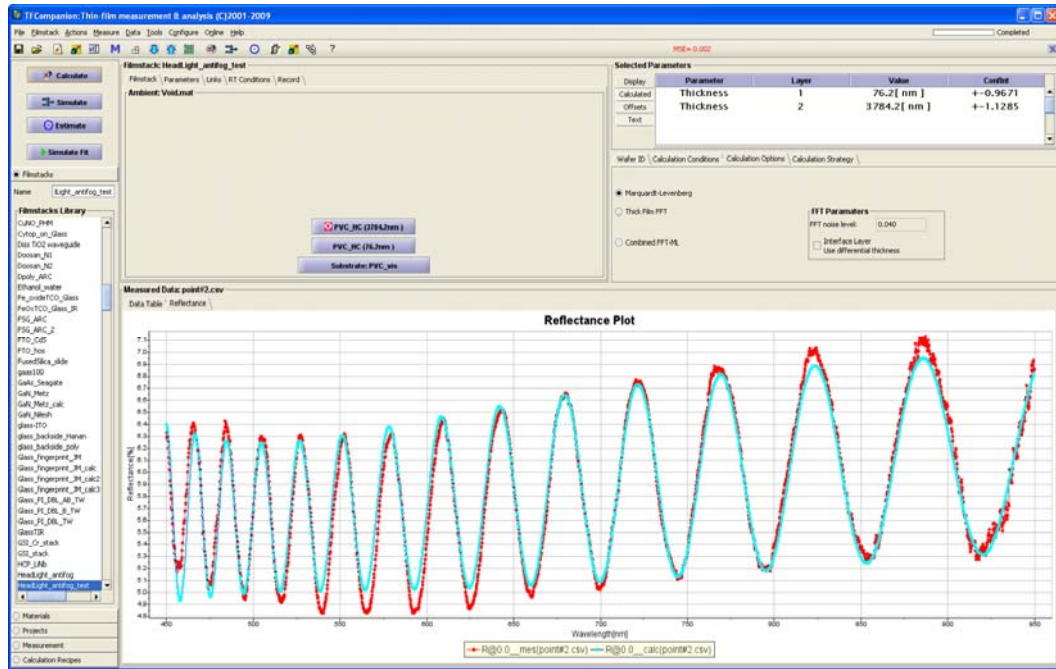
**Fig. 3a** Taillight with hardcoat (on textured surface): Reflectance spectra measurement.



**Fig. 3b** Results of the measurement of the red headlight with hardcoat. The hardcoat thickness - 8.7 μm, primer thickness - 1.4 μm

#### IV. Anti-fog coating measurement

Anti-fog coating is deposited directly on the surface, without primer as opposed to hardcoating. As a result it exhibits a very thin interface (IPL) layer. It is frequently important to measure this layer to confirm the good adhesion of the coating.



**Fig. 4** Fit of the model to measured data: anti-fog coating 3.78  $\mu\text{m}$ , IPL (interface layer) 76nm