



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

MEASUREMENT OF POLYURETANE ON METAL

SUMMARY

Polyurethane enamel coatings are widely used as a metal and polymer finish. In many cases it is important to control the thickness the coating to ensure durability and good performance.

Four samples of polyurethane coated metal samples (Aluminum (Al), Stainless steel (SS) and two Nickel samples (Ni-1, Ni-2)) were measured using MProbe VisHR system in 700nm – 100nm wavelength range. Optical dispersion of polyurethane was represented using Cauchy approximation. Polyuretane refractive index is, typically, ~ 1.5. For analysis of measured data we used R.I. ~ 1.47. (R.I. has relatively small effect on physical thickness measurement: change of 0.01 in R.I. corresponds to ~ change of 0.01µm in measured thickness). The data was analyzed using a thick film algorithm. SS sample had glossy coating, Al has semi-glossy coating and Ni samples had matted coating.

In case of matted coatings reflecting is significantly reduced due to scattering and interference pattern smoothed. Nevertheless, it was possible to measure all 4 samples successfully.

All films are in the 20um -50um thickness range, so thick –film algorithm was used for data analysis.

Results of the measurement are summarized in Table I below.

Table 1 Measurement results

Sample	Thickness, µm
Al sample	51.61
SS sample	40.39
Ni -1	21.61
Ni- 2	41.22

DETAILS

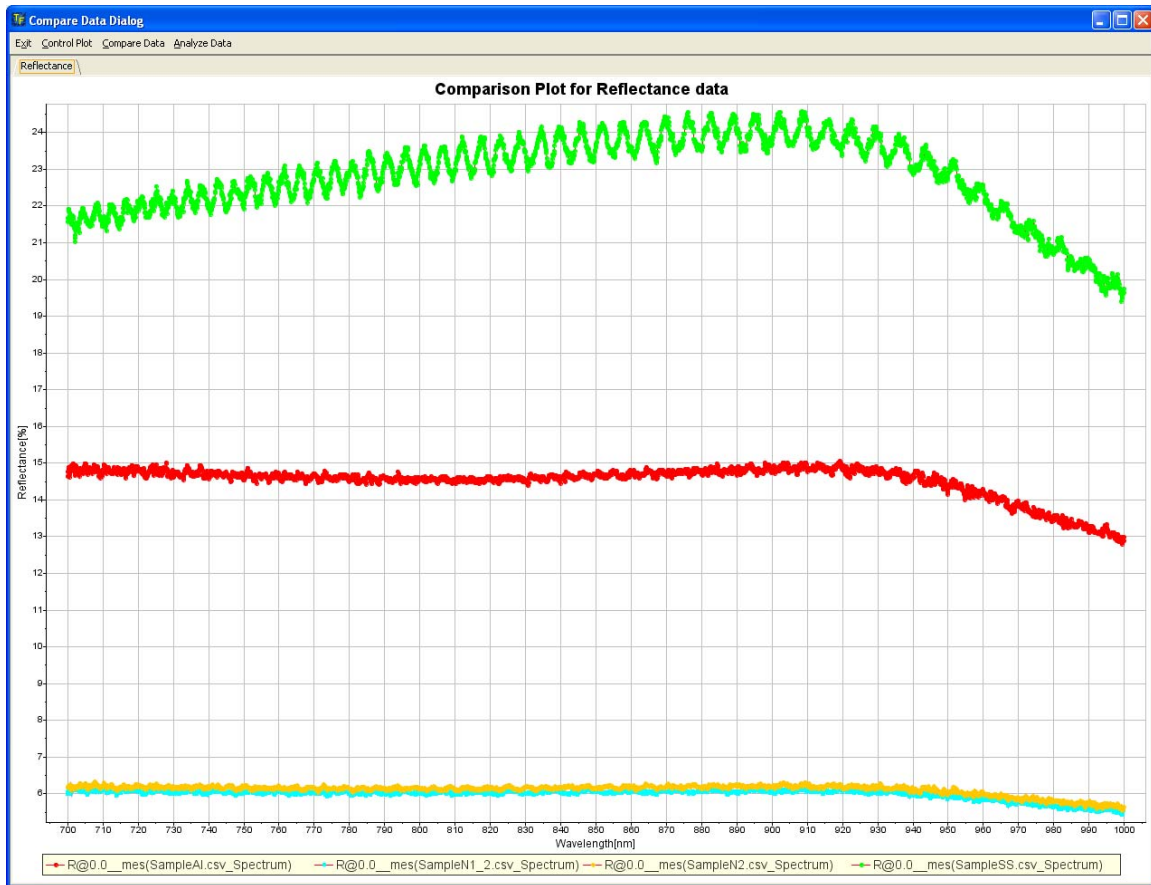


Fig. 1 Measured reflectance spectra of the samples
Green – Stainless steel (SS) sample (glossy coating)
Red – Aluminum (Al) sample (lightly matted)
Two curves correspond to Ni samples (matted)

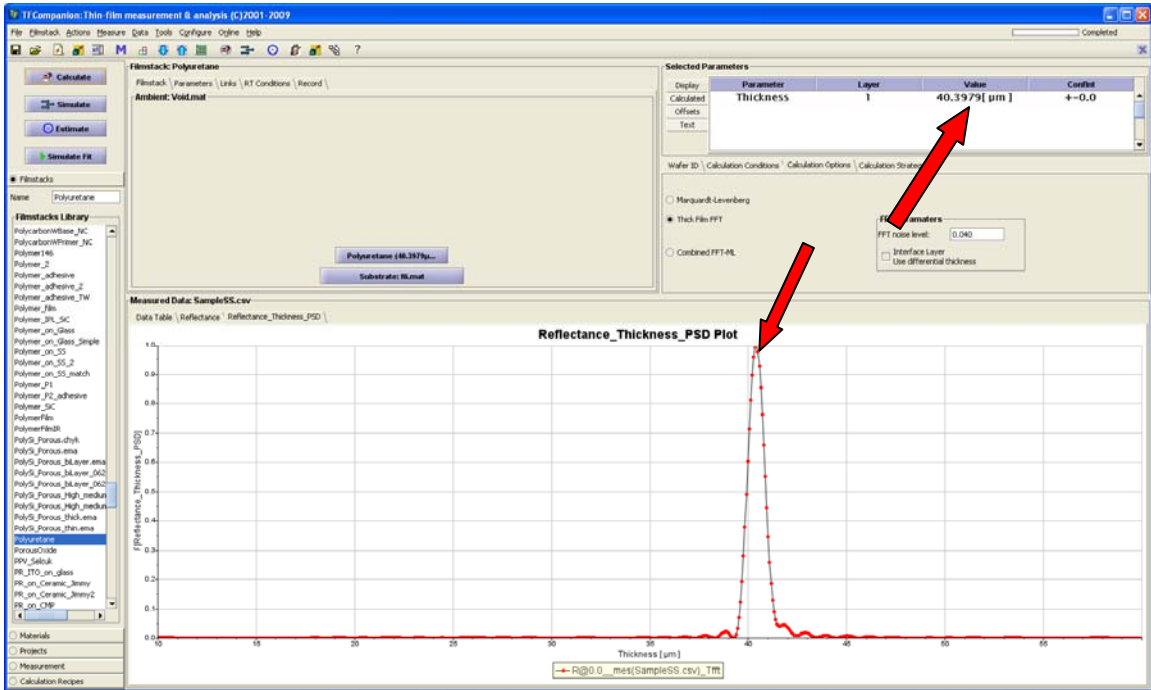


Fig. 2 SS sample data analysis (thickness = 40.39 um). Position of the peak indicated the film thickness.

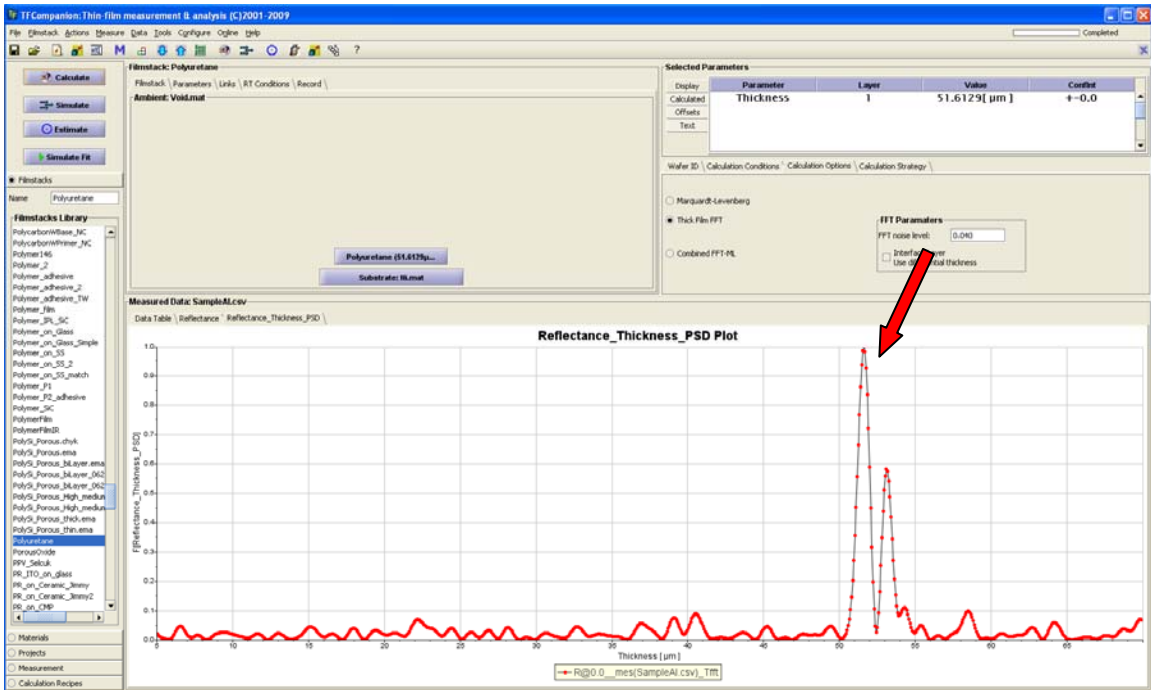


Fig. 3 Sample on Al (Thickness = 51.6 um). Position of the peak indicated the film thickness.

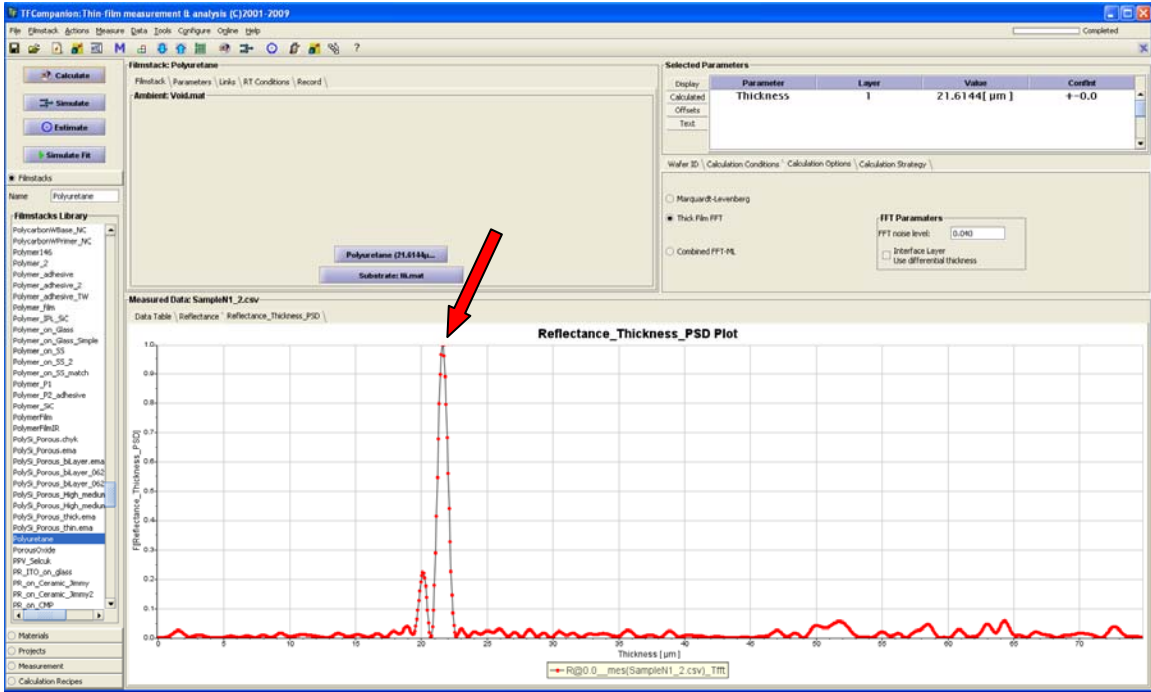
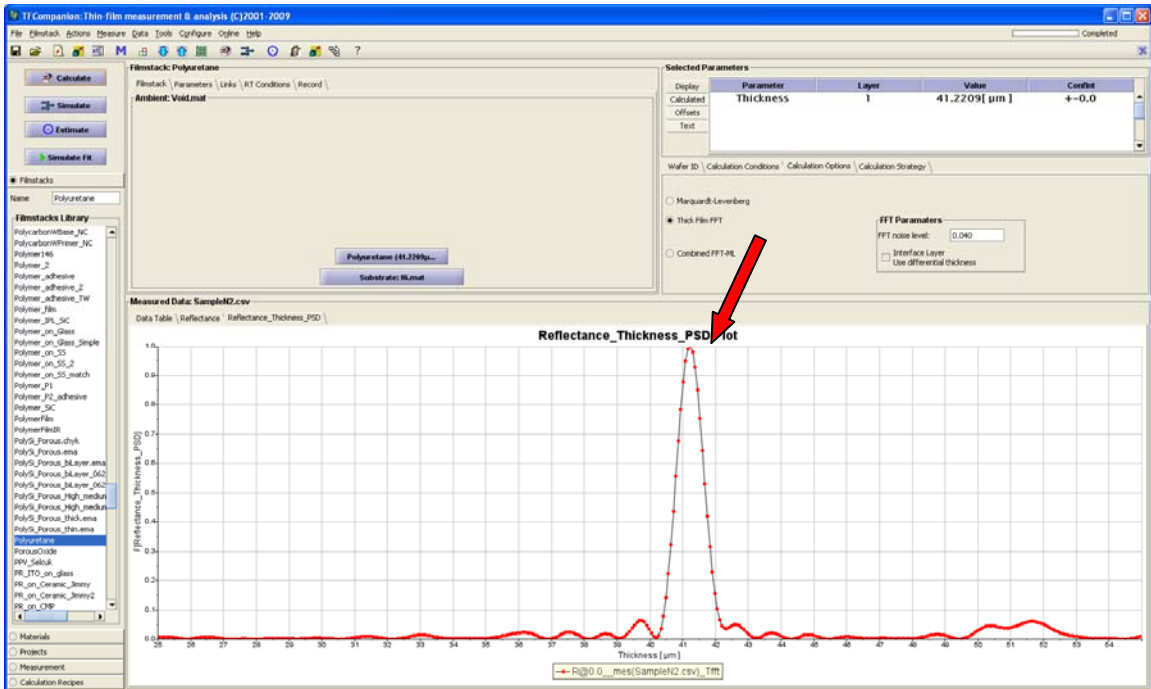


Fig.4. Sample Ni-1 (thickness= 21.6 um) Position of the peak indicated the film thickness.



Fig, 5. Sample Ni -2 (thickness = 41.22um) Position of the peak indicated the film thickness. the peak is clearly visible despite very weak interference pattern in the measured data.