

The Meaning of a Gloss Meter Measurements

J.S. Arney, Ling Yi, and Steve Banach*

Center for Imaging Science

College of Science, RIT

Abstract

Gloss meters are commonly used to measure characteristics of the specular light reflected from materials. Such meters are based on illumination and detection at equal, opposite angles. The particular angle, θ , and other details of instrument geometry, are well known to play major roles in the results produced by a given meter, so several standards have been developed for gloss measurements that specify the geometry and optical characteristics of gloss meters.¹ Nevertheless, the reason why gloss meter readings change with θ , and the reason why meters of the same θ produce different readings seems not to be well understood. The focus of the study described in this paper has been on exploring these effects. A quantitatively predictive model of gloss a gloss meter was constructed from Fresnel's law surface reflection combined with empirical models of bi-directional reflectance distribution functions, BRDFs. The results strongly indicate that the width of the BRDF, and presumably the roughness of the surface, plays the major role in governing the reading from a gloss meter. Differences in index of refraction, by comparison, appear to play only a minor role. In addition, differences in gloss readings produced by instruments of the same angle, q , but conforming to the same TAPPI gloss standard were found to be the result of differences in the instrument angles of acceptance. The results of these studies suggest that it may be possible to make better use of conventional gloss meter measurements by making measurements at multiple angles, θ , rather than just a single angle.

* Speaker: Mr. Steve Banach, senior majoring in Imaging Science