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**The Art and Science of Gloss perception and Measurement**

An vital optical property – Gloss, it determines the degree to which a surface reflects light, playing a crucial role in influencing visual perception, capturing attention, and providing an elevated sense of aesthetic, Humans have come a long way from understanding gloss as a merely physical measurement to the present understanding of gloss perception as a intricate interplay of illumination which is a complex interaction involving surface characteristics, observer perception… [1]. Variations of gloss affects object identification and shape recognition, in one study they show that animals may use variations in gloss rather than color differences to understand the surface better, likewise there are so many important and interesting characteristics of gloss perceived by humans and animals [1,2].

The perception of gloss is influenced by various factors such as specular highlights (bright reflections), lowlights (dark reflections), diffuse shading, and surface shape. The congruence of these elements helps the visual system to accurately estimate the glossiness of a surface, distinguishing it from other luminance maxima generated by variations in pigmentation or illumination [3-6].

Measuring gloss is a tricky part, In the paper [7], they measure the specular reflection from various materials using an optical pyrometer, independently from the background brightness which is a diffuse reflection. In another paper [8], unlike the paper [7], they utilize the concept of appearance measurement by involving observer’s scaled data and comparing with measurement of gloss using a glossmeter and a spectrophotometer. Apart from this latest research of using Spectrophotometer in measuring gloss and in context of gloss [9,10] and analyzing gloss data using micro-goniophotometer in terms of optical properties of glossy material [11,12], We can see one of the oldest papers on the instrument measuring gloss, “Glarimeter” – it was based on the principle that light is polarized in specular reflection [13].

Contrary to using glossmeters or like the papers discussed above, the latest research on image based measurement of gloss [14,15] introduces a new method iGM using a CMOS detector capable of evaluating four attributes such as specular gloss, DOI, haze and contrast.

Gloss measurement is important in various industries as it can affect product performance, aesthetics, and consumer appeal. Through Frank Stella’s artwork with its diverse range of surface texture, we can try to understand the importance of quantifying surface appearance, especially gloss [17]. The appearance of an object hugely influences consumer’s choice, understanding physical and chemical properties of metal surfaces is important and several methods are derived and there is a need for fundamental research and measurement of appearance of a material/object that will benefit many industries [16]. Gloss also influences the basic needs of daily life, The paper. As surface smoothness increases and air permeability decreases, the printing ink requirement for adequate opacity decreases and then print quality and gloss increases, the surface structure of a paper is one of the important factors to consider to obtain a good print quality [18]. Using refractive index, rms microroughness amplitude and FWHM of the surface slope distribution, we can derive in a model to measure the gloss of surfaces that have two scale random roughness, which includes many industrial materials such as coated paper and paints [19]. Measurement of specular gloss in metallic coatings in the Automotive industry is highly important. The results that are obtained using current glossmeters are discontinuous and nonmonotonic which causes inconvenience for the industry, The paper [22] discusses a new model that improves the accuracy of estimating visual gloss and which provides a practical metric based on geometry dependent measurements to obtain accurate gloss readings.

Gloss meters are not always reliable, upon studying the repeatability and reproducibility of six commercially available specular gloss meters and testing with glossy objects under standard conditions, we can understand that the practical values of repeatability and reproducibility are higher than those specified by the manufacturers of those gloss meters, indicating higher caution of the results obtained from these instruments [20]

Not all gloss meters are reliable, Upon comparing a traditional gloss meter with a sophisticated gloss meter to assess the appearance of metallic embellishments in printing, we find that the sophisticated gloss meter performs well to judge the image forming capability of glossy surface [21].

In conclusion, Gloss is an very important optical property that provides a aesthetic experience regardless of the product it possess. Measurement of gloss is crucial in many industries [16,17,18,19,22]. However measuring gloss is tricky and not always reliable[20,21]. There is a need for higher research in measurement of material surface, especially in terms of gloss. Image based measurements [14,15] continue to rise in recent years and Gloss imaging that is non-invasive which can be used to measure gloss in artworks from a distance will benefit many industries.

**References**

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