



Color Measurements and Metallic Coatings

INTRODUCTION

Metallics, pearlescent, and other complex special effect finishes deliver limitless possibilities for enhancing product appeal as well as limitless challenges when quantifying color.

Coatings containing metallic and effect pigments change appearance as the illuminating and viewing angles change. This phenomenon is called gonio appearance, and the changes in appearance can be very dramatic.

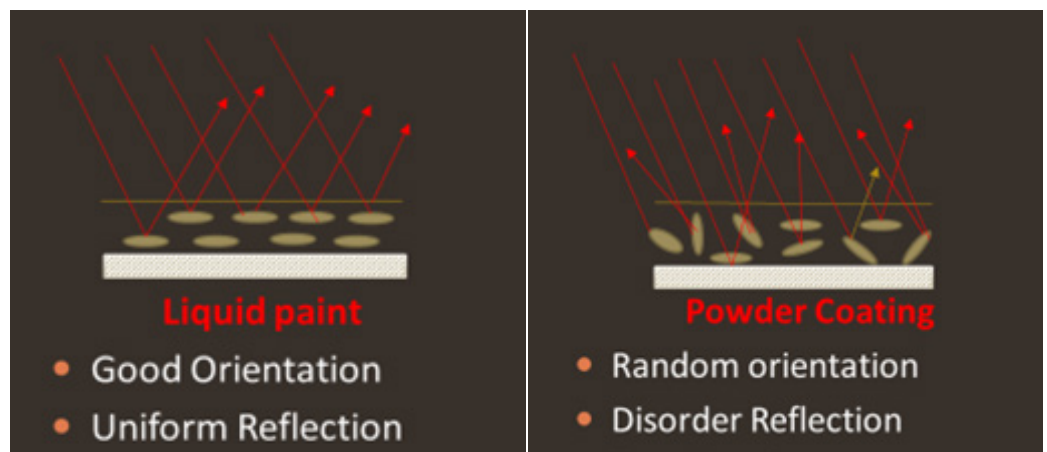
The total perception of the color and appearance is influenced by the sparkle which changes with the angle of illumination and the graininess or flake diameter. Along with changes in illumination and angle these coatings can change with different rheology and paint formulations that affect flake orientation, thus color.

Color in coatings is measured using a spectrophotometer where the coated surface is illuminated, and the reflected light at a fixed angle is measured. The more widely used spectrophotometer uses the reflected light at a 45° angle to “read” color. As metallic and special effect coatings change color depending on the viewing angles the single fixed angle spectrophotometer does not properly provide a good representation of color in those systems.

For years there has been a push by the automotive industry to develop instruments that can be used to measure color differences between metallic samples considering all the variables.

Multi-angle spectrophotometers were developed to measure color at different angles to capture all reflectance. However, the work has been done mostly with liquid coatings. All calculations and algorithms used to compute color are based on how the metal flakes orient in liquid systems.

Now as it is well known, the orientation of metallic/mica flakes in powder systems is different due to the rheology of powder coatings compared to that of liquid systems. The graph below illustrates how the metallic flakes orient in each of the systems.



Graph showing metallic flakes orienting themselves in powder and liquid systems.





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More work is needed to adopt the use of multi-angle spectrophotometers in the powder coating industry given the current limitation of such equipment when used in powder coatings.

To overcome the obstacles of using single-angle spectrophotometers, Vitraccoat uses strict agreed-upon light sources and viewing angles for color approval of metallic coatings. Additionally, the colored non-metallic base used to make the final metallic coating is color controlled using traditional methods.

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