

Over the past few months, I've been renovating my house, and while the structural design elements came easily, I struggled with choosing a color palette. After looking through hundreds of photographs of kitchen cabinets, I finally found something I could imagine living with for the next 10 years and downloaded a color identification app to find out the name of the color. The app lets you pinpoint an area of an image and analyzes the pigment to come up with an exact color match from a particular paint brand. It sounded simple. But when I began using the app, its limits quickly became clear; the further the cabinets were from the light source, the darker the color appeared, leading to a seemingly limitless range of potential options. How could I be sure that the area I was selecting represented the true color I was looking for?

Manufacturers of consumer and industrial goods face a similar dilemma when it comes to color measurement: how do you obtain accurate readings [when texture affects how light acts on different areas of a sample?](#)

The Problem of Texture Variation

Texture variation in consumer and industrial goods presents special challenges for color measurement; the peaks of the sample appear lighter than the valleys as the depth of field alters our perception of color. This creates problems for gaining consistent color measurement not only within a sample, but between samples. Traditional time interval-based laboratory testing may erroneously flag color variation between two identically pigmented samples due to differences in texture. For example, two pieces of embossed vinyl siding may, in fact, both be within spec, but a heavily textured portion of the siding may appear to be darker than a portion with less embossing. If an operator neglects to press the samples flat prior to testing and does not account for texture variation, they may then scrap good product and make unnecessary changes to the production process to compensate for a phantom issue, throwing future products out of spec and creating costly waste.

Room for Human Error

In some manufacturing processes, operators may try to minimize variation by using strict sample preparation guidelines to maximize uniformity or taking multiple readings to avoid texture interference. Powders, for example, may be arranged to a specific density and height prior to testing in an attempt to create consistency within and between samples. In the case of textured plastics, operators may be required to press the sample flat and take three readings, rotating the sample 33 degrees between each reading, and averaging the results in an attempt to compensate for texture. However, these are labor-intensive processes and depend on predictable operator behavior, opening the door for human error and leaving the production line vulnerable. Even slight differences between the sample preparation habits of operators may jeopardize the accuracy of the color measurements and create inconsistencies within the finished product.

Integrating Height Measurement in Spectral Analysis

How, then, do you ensure consistent and accurate color readings in non-uniform materials? HunterLab offers an elegant solution in the form of spectrophotometric instruments with integrated laser height measurement capabilities that take quality control to the next level. The embedded laser continuously analyzes sample height and uses a unique algorithm to compensate for texture variation, optimizing color monitoring precision. Integrated height measurement minimizes the risk of human error, can eliminate the need for precise sample preparation, and can account for variation in sample presentation. By seamlessly

incorporating color and height measurement in production lines, manufacturers can decrease reliance on labor-intensive testing processes, minimize scrap, and realize significant cost savings.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-measurement-2/the-effect-of-texture-ensuring-accurate-color-measurement-through-integrated-height-measurement/>