

We live in a highly globalized community where goods and services move across the world with a click of a button. With product development that spans continents, the demand for synchronization and compatibility are in high demand. Paints and coatings add the finishing touch to many of these products and are necessary to preserve and protect, as well as to create visual appeal. In order to guarantee a perfect match, pigment color mixing depends on instrumental analysis to ensure colors are consistent no matter where they are produced and manufactured. Spectrophotometers use innovative technology to quantify color and develop a system that warrants repeatable compatibility. Color instrumentation is the key to quality in paint and coating development.



Instrumental analysis of additive and subtractive color mixing takes the guesswork out of color matching. Understanding the principles of pigment theory is the first step to developing a repeatable quality product.

Image Source: Flickr user Rhian vK

#### Additive and Subtractive Color Mixing

Understanding the physical properties of color is the first step to developing a pigment mixing system. Pigment theory refers to the concept of additive and subtractive color mixing where the pigments relate to the subtractive color and light relates to additive color.<sup>1</sup> Variations in colors depend on this theory of tinting and shading to achieve the desired color.

Analysis of pigment color mixing utilizes [human eye technology](#), where all colors are represented by light and fall within the realm of primary colors. Pigments absorb and reflect light at specific wavelengths and this is how the eye perceives color. Instrumental analysis uses these same principles to quantify wavelengths and assign numerical values to color. Human perception of color

is subjective, but spectral analysis can detect even the slightest changes in color for precise color matching capabilities.

#### Finding a Perfect Match with Absorption Measurements

[Creating a perfect color match](#) extends far beyond the reflected color that we see. Instrumental analysis is not simply assigning a color value a name, but understanding the absorption qualities of that formula to allow for repeatability at any given time and in any location. The physical behavior of pigments are complex and reflected color is often a combination of hues rather than the one specific color which is perceived. By [measuring the absorption qualities of paints or coatings](#), a more accurate representation of color can be quantified and assigned a numerical value for repeatability. Spectrophotometers are designed to simplify this process with an easy-to-use compact tool.



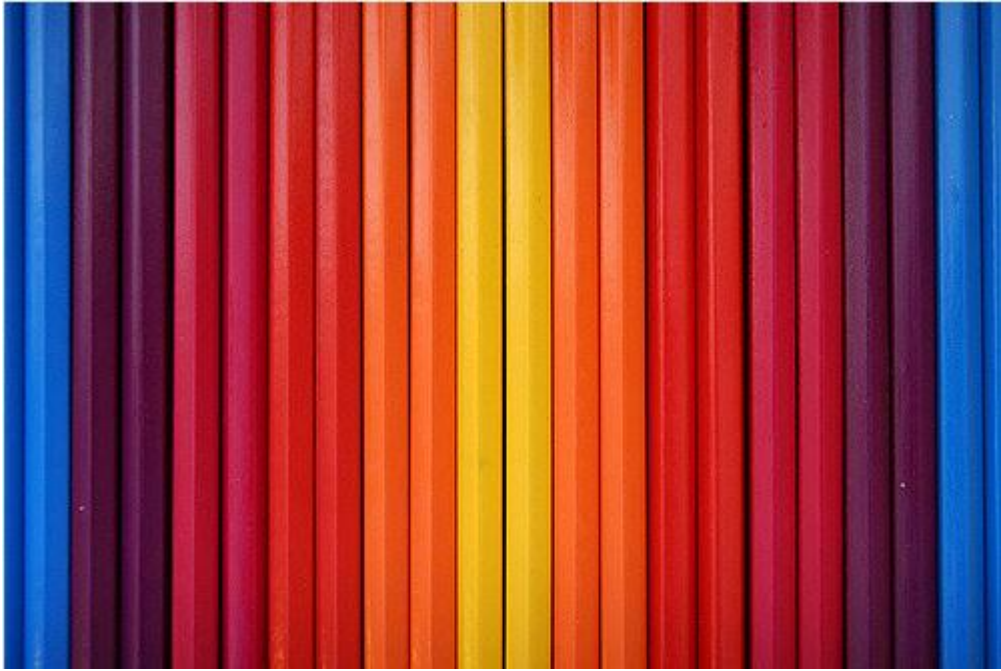
Paints and coatings are often applied at various locations, so ensuring color matching and compatibility is essential in creating a quality product.

Image Source: Flickr user Dale Earnhardt Chevrolet

Precise instrumental analysis is extremely important when paints or coating are applied at various locations and must come together in an exact match for developing a completed product. For example, in the automotive industry, many parts are manufactured separately, yet [color compatibility](#) is essential for ensuring quality and marketability. Spectral technology offers an easy and affordable solution for creating a repeatable set color pallet.

#### Developing a Color Index with Spectrophotometry

The paint and coating industry relies on specific [sample matching technology](#) to meet consumer demands. Developing a color index allows manufacturers to assigns all color formulations a numerical identification code to ensure color sample matching.<sup>2</sup> By using a color sample index, manufacturers can provide a wide selection of color samples and ensure an exact match every time.



Developing a color index with spectral technology allows for numerical data to be stored for repeatability and color quality. Image Source: Flickr' user Dennis Hill

Specific color formulations can be quantified and stored using spectrophotometric instrumentation and software, simplifying the color mixing processes and sharing this information at any production facility. Instrumental analysis offers an easy and reliable method of quality control in final product development that can be repeated again and again.

#### Options and Variations in Color Measurement Instrumentation

Color measurement instrumentation is available in a variety of styles that are designed to meet specific industry needs. In the paint and coating industry, continuous process control and color formulation monitoring are necessary for quality control. Instrumental analysis provides the numerical values needed to correlate with visual color perception. This allows for precise color matching capabilities and repeatability no matter where you are. HunterLab specializes in color measurement instrumentation for paints and coatings, and our spectrophotometers are designed specifically to meet the needs and challenges of this industry. From portable and bench top models to on-line measurement systems, HunterLab offers cost effective solutions to meet the various needs of the paint and coating industry. For more information regarding the products we offer, please [contact us](#) today.

1. "Subtractive Color (Mixing Pigments),"

<http://www.asu.edu/cfa/wwwcourses/art/SOACore/subtractivemain.htm>

2. "Understanding Pigments," 2016, <http://www.akuainks.com/understanding-pigments>