

I've driven the same vehicle for over a decade, and I'm not generally a fan of car shopping, so I took advantage of a recent chat with an automotive client to educate myself on industry trends. As luck would have it, one of the most intriguing developments was actually our main topic of conversation: color changing cars. Where automotive paint products were once used to protect the surface of a vehicle or lend to its aesthetic appeal, scientific breakthroughs have opened the door for new coatings that can change color based on a variety of internal and external stimuli.



The chameleon effect in paints and coatings is a new technology allows for controlled color changes at the push of a button. Image Source: Flickr user Michael Shehan Obeysekera (CC BY 2.0)

But with these innovations comes the challenge of developing a quality control system to monitor color changes and ensure repeatability—and this challenge was the reason for my client's visit.

The science of color technology for cars is based upon the way that light is absorbed and reflected from the surface of the vehicle and the way our eyes perceive these colors. Though the ability to manipulate color change is relatively new, [advancements in color science](#) have been steadily building for over half a century. In many ways, spectrophotometers represent the pinnacle of this technology—they can convert color data into quantifiable terms that are more accurate than the human eye alone.

New advancements will always bring new challenges, so it's important for automotive manufacturers to choose—and fully utilize—versatile color measurement instrumentation.

Measuring Color Changing Paints and Coatings

The first step toward accurate color measurement is understanding the variations in color changing technology now being used for cars.

Thermochromatic paint technology¹ has been around for several decades, but the ability to utilize the material commercially is a fairly new development. This heat sensitive coating has many

applications and is already used for a variety of safety products and [energy efficient materials](#). However, consistently measuring the color of heat-sensitive materials requires a highly controlled environment and special attention to formulation and change.

Spectrophotometers allow for the controlled measurement of samples and offer the ability to isolate many variables, such as temperature, coating thickness, and viewing angle. Since these paint and coating materials rely on [various additives](#), such as liquid crystals and leuco dyes to transform the arrangement of light reflecting crystals in the pigments, spectrophotometers are necessary for quantifying changes in color throughout the formulation process.



Heat sensitive paints and coatings require special formularization and monitoring to achieve desired results. Image Source: Flickr user Dean Hochman (CC BY 2.0)

If heat-sensitive paints and coatings were not amazing enough, color changing technology for cars now allows adjustments with the push of a button. This new option is called chromism and works by manipulating the electrons within the chemical structure of the paint², causing immediate visual changes in color perception. Conducting electricity through the base material allows tiny prisms within the coating to shift, altering the absorption of light and reflecting a new color at the driver's whim. The technology itself uses the basic principles of spectral technology to alter the viewing angle within the paint or coating, and the effects are quite breathtaking.

Of course, developing color consistency in products like these can be very challenging. The technology requires advanced spectrophotometers to measure and quantify color and provide the [data needed for quality control](#). While these products are still in the early phases of development, as consumer demands increase, quality analysis will play an increasingly important role in marketability.

Color Technology Innovators

Color technology has been around for nearly a century, yet new possibilities continue to emerge as science uncovers the mysteries of [light and perception](#). From [medical breakthroughs](#) and [building materials](#) to improvements in [food production](#) and [medicine](#), spectrophotometers continue to push the boundaries of technology. At HunterLab, we understand that innovation is the key to the future. That is why we continue to create new instrumentation to meet the changing needs of each industry.

Our products also meet the high-volume quality control necessary for paint and coating within the automotive industry. Keeping color consistent around the world is our top priority, and our mission is to create easy-to-use spectrophotometers that offer both accuracy and versatility. For more information, and to learn more about the best color measurement instrumentation options for your needs, [contact HunterLab today](#).

1. "The chameleon Lamborghini: Vehicle changes colour to reveal a Captain America design thanks to heat-sensitive paint", July 31, 2015, <http://www.dailymail.co.uk/sciencetech/article-3181500/The-chameleon-Lamborghini-Vehicle-changes-colour-reveal-Captain-America-design-thanks-heat-sensitive-paint.html>
2. "Color Chameleon – Advances in Color Changing Paint and the Science Behind It", November 22, 2013, <https://gardnerlaboratories.com/2013/11/22/chemistry-corner-more-color-changing-paint-byk/>