

The world of 3D color printing is exploding with new possibilities, and as new options in design and technology progress, the need for more advanced color measurement systems will need to accompany this growth. As instrumentation becomes more affordable and material supplies continue to expand, spectrophotometers provide the most versatile and precise method for [color measurement and matching technology](#), allowing 3D printing capabilities to reach new heights in reproduction no matter what raw materials or color additives are used.

Color Additives and Sample Standards

With a more widespread adoption of 3D color printing, the color palette has expanded. This technology is comparative with ink jet printing technology and color palettes use similar combinations of yellow, cyan, and magenta to achieve a variety of color options. Color additives are typically included with the bonding materials within the printer and require precise measurements to achieve desired results.

In order to set up a color palette for 3D printing materials, samples must be developed using color measurement instrumentation to quantify each value and create a set of standards necessary for repeatability. Variations are common based on the specific properties of raw materials and the interaction of bonding materials to create a set of color standards. Spectrophotometers are the most reliable and accurate way to quantify these changes.

Based on the finishing properties of 3D prints, color changes are often influenced by the infiltrant agents used, which tend to cause a decrease in lightness and chroma value.¹ [These variations require the use of spherical color measurement technology to accurately quantify these changes and account for various surface textures.](#) Color measurement of test blocks is most accurately evaluated using a sphere spectrophotometer with a $d/8^\circ$ measuring geometry which accounts for these surface texture changes.

New Applications Expand the Future of 3D Color Printing

The rise of 3D color printing applications is helping to span the gap between the art of design and scientific development. The marriage between 3D printing and biotechnology is sweeping the headlines as new developments in artificial cell replacement bring promise to the medical field.² [Color measurement is already widely used for medical technology and serves a variety of needs to differentiate the many properties of the biological realm.](#) With the ability to reproduce human organs and body parts, color measurement instrumentation becomes even more important in the development of 3D printing capabilities.

These breakthroughs in 3D color printing are just scratching the surface of possibilities that this technology can achieve. New applications are rising in the industrial realm with the increased use of 3D printing in the reproduction of laboratory parts and materials. 3D color printers and materials are quickly becoming a commonplace in today's industrial society. The ability to precisely duplicate color, shape, and size are revolutionizing the way manufacturers develop parts within their own walls.

Combining Technologies Leads to Perfection

Spectrophotometers are necessary throughout the color development process of 3D printing and can ensure uniformity and repeatability by monitoring each stage of color production. From the raw materials and ink colorants that are added to the binders to the final product sample block palette, spectrophotometry plays an important role in the advancement of 3D technology.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-plastics/effectively-utilizing-color-measurement-in-3d-color-printing-and-design/>