Why True Color 3D printing capability matters

mcor technologies
unfettered innovation™

Introduction

Whether we're drawn to the lush green of a shade garden in June or recoiling from a bright red stream of spilling blood, color is a profound part of the human experience. For this reason and more, color is immensely valuable if you're producing objects for people's edification and enjoyment, as from a 3D printer.

Whether you're a designer, engineer, architect, artist, animator, student, doctor, healthcare provider, entrepreneur or manufacturer – you live, think and create in full, living color. More importantly, your clients, patients, students, audience and consumers do too.

In this paper, we'll look more closely at why *True Color* (defined as realistic and accurate multicolor) matters so much in 3D printing, and the high price you pay when you don't have the equipment to master it.

Color or monochrome, what's the big deal?

In consumer products, color plays a huge role in making your product stand out on the shelf. Which color or design will prompt the consumer to bond emotionally with your product? It's no fluke that Coca-Cola's red hasn't changed for decades.

If you're printing one-off products, e.g., 3D photographs or statues of people or pets, color is every bit as important as it is in real life. For maximum impact, the colors need to be precisely the ones the photo file contained or the designer intended. A minor shift in eye color or skin tone can render a person's likeness unrecognisable.

Beyond sheer esthetic appeal, color allows a 3D printed object to convey far more information than a monochrome (single-color) object. This communication occurs via labels, diagrams, color codes and texture maps 3D printed directly onto an object. Colorful 3D printed models can show:

- A surgeon where to cut before entering the operating room.
- Manufacturers precisely what the end product will look like or how to assemble a product.
- Real estate developers and planning boards what an office tower will look like.
- Museum curators and patrons how ancient artifacts actually appeared millions of years ago.

Yet, given the undeniable importance of color, how did we get to a place where the vast majority of 3D printers are monochrome, and where even most "color" 3D printers are limited to printing a handful of colors?

Easily. We "accept" monochrome 3D printing because most 3D printers simply cannot print True Color models. If they could, they would. Certainly, most 3D printer manufacturers want their products to print with the range, realism and accuracy of document printing, but this level of high-resolution color is now achievable only in a very few 3D printing technologies.

Color vs. monochrome

The value of True Color is striking when comparing these two 3D prints:

With the monochrome model on the right, not only do you lose hues (e.g., blue in the eyes, red in the lips, etc.), you don't even have grays to depict the features that make a face.

In the world of 3D printing, "monochrome" is precisely what the roots of the word suggest: *one color*, that of the build material. To print even in black and white, you need to apply the color black onto a white build material. Thus, you need a color 3D printer. This can be confusing because of the way that monochrome document printers are said to print in "black and white."

Regardless, virtually everyone in every instance would prefer that a physical 3D printed model appear similar to its real-life counterpart and certainly as its designer intended. Only with the most color-accurate 3D printers today is this possible

Example of 3D printed banana created in True Color on an Mcor IRIS 3D printer.

Applications made possible with True Color 3D printing

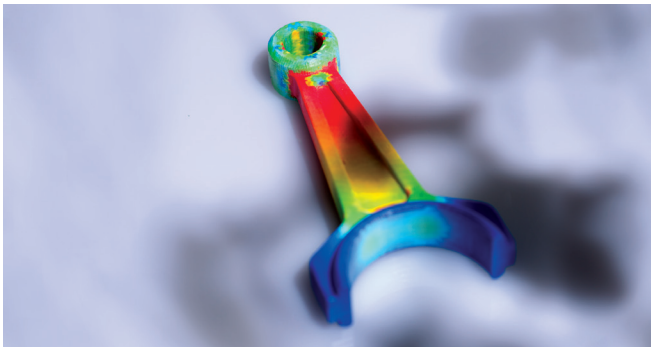
The range of uses for True Color 3D printing is vast.

MCAD form and fit. You can move products to market faster by making realistic concept models early and often in a design project. They help you confirm that a design is correct, and uncover hidden problems.

iPhone prototype 3D printed in True Color on an Mcor IRIS 3D printer.

Product labeling. You can 3D print a commercial logo or engineering label directly onto your model instead of painstakingly painting it on later or doing without it. A color 3D printer lets you add text, graphics, barcodes, engineering labels, dimensions and other notes.

Engineering analysis. Teachers can bring finite element, stress, flow, heat and solar analyses off the screen and into their students' hands for greater understanding and learning. For example, colors can show the areas of the object that are weaker or stronger.



Conrod displaying finite element analysis 3D printed directly onto the model in True Color with an Mcor IRIS 3D printer.

Textures. You can print texture maps (images, photos, shadows, wood, carbon fibre, bricks and trees and other details) directly onto your model so that it looks just like the real-life object. You can use the realistic models for marketing, sales, client presentations, focus groups and detailed design testing.

Mcor IRIS 3D prints colors and textures directly onto this Villa model.

MCAD production planning. Highlight surfaces of your model with color to spell out machining operations, manufacturing tolerances or assembly steps.

Footwear and clothing design. Evaluate color options and shapes to determine how the final product will look in the packaging, on the shelf and on you.

Packaging design. Ensure your product is the one that possesses the highest shelf appeal. And use 3D printed models as patterns for vacuum-forming full-color packaging in small batches. Durable, full-color 3D printed living hinges allow you to make folding packaging objects.

Packaging prototype with living hinges, 3D printed in True Color, including logo, images and text.

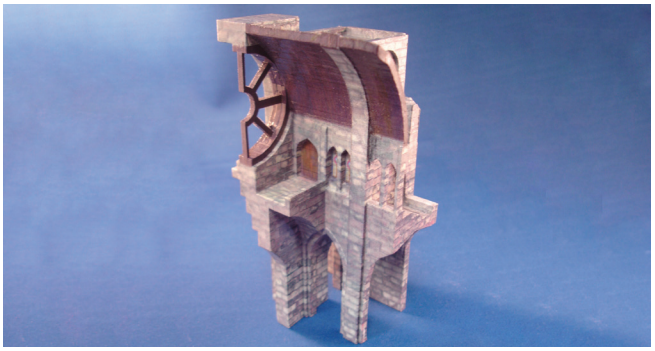
Archeology and cultural heritage. Replicate ancient artifacts to encourage appreciation without damaging the originals. Or recreate artifacts that no longer exist.

Ancient skull 3D printed on an Mcor IRIS 3D printer.

Medical applications. Distinguish anatomical parts with color to prepare for complex surgical procedures, resulting in reduced patient time under anesthesia and a better outcome. Model tumors, DNA, molecules and bacteria. Plastic surgeons can even use color 3D printing to show a patient what they'll look like following surgery.

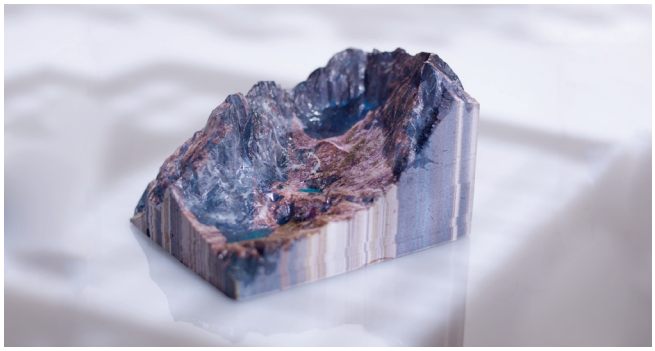
Brain model, using True Color 3D printing to distinguish different anatomical parts.

Architecture. Illustrate what a building will look like when completed, resulting in faster approvals and increased sales.



Cathedral model showing True Color 3D printed textures.

3D map and GIS models. Google scans the planet and releases 3D maps that can be printed in detailed color, useful for many applications in civil engineering, flood and evacuation planning, military planning and consumer applications. Travelers can print their favourite vacation spots.



GIS model 3D printed in True Color on an Mcor IRIS.

Marketing, display, custom giveaways. 3D printing can be used to display one-off objects to suit the theme of the week or month. It's easy to produce custom gifts and giveaways. 3D printed models are also useful in focus group testing, tradeshows and for photographs of products that aren't yet available.

Entertainment, art, ceramics. Artists increasingly use color 3D printing in developing their creations. Filmmakers, animators, game developers and other digital arts professionals are using True Color 3D printing for character, prop and scene development.

Realistic figurine 3D printed on an Mcor IRIS.

Consumer 3D printing. The consumer market is growing rapidly as more 3D design data is becoming readily available. 3D portraits, for example, are a growing trend, and the possibilities are endless for custom-made gifts and ornaments.

3D photo produced in True Color on an Mcor IRIS 3D printer.

Conclusion

True Color 3D printing capability is both valuable and rare. While a wide range of 3D printer materials and prices are available, only a tiny fraction of 3D printers can provide color capabilities equivalent to those of a color document printer.

The industry's most True Color-capable device is the Mcor IRIS 3D printer, able to print accurate, realistic designs in more than one million colors simultaneously. The Mcor IRIS renders color as rich, vibrant and complex as it appears on a computer screen. That's partly because the build material is paper, the original and natural medium for colored ink. The plaster employed by other 3D printers washes out intended colors, significantly diminishing the accuracy of the color.

In addition, Mcor's patented ink is specially formulated to penetrate paper, resulting in consistent, rich color fidelity.

Another crucial factor in the Mcor IRIS' True Color capability is that it's the only 3D printer to include an International Color Consortium (ICC) profile, meaning the 3D printer will precisely produce industry standard colors as presented in a photographer's, engineer's or designer's photograph, CAD model, scan or illustration. Without it, intended colors are often corrupted.

Is color 3D printing expensive?

No. True Color 3D printing is surprisingly affordable, with the most color-capable machines offering the industry's lowest operating costs. The Mcor IRIS uses ordinary sheets of office letter and A4 paper as the build material. Its tough, durable, wood-like 3D printed models cost just 10-20 percent of models created on other 3D printers.

As a result, True Color 3D printing offers the rare opportunity to obtain higher value at lower costs. And the value difference between True Color and the narrow capabilities of monochrome and limited-color devices is considerable.

With True Color, you, your clients, your team and your patrons can experience the full benefit of capabilities that make 3D printed objects appear real, look exactly as the designer intended and make a deeper impact on the audience for whom your 3D models are created.

About Mcor Technologies Ltd

Mcor Technologies Ltd is an innovative manufacturer of the world's most affordable, full-color and eco-friendly 3D printers. They are the only 3D printers to use ordinary business paper as the build material, a choice that renders durable, stable and tactile models. Established in 2004 with a talented team of specialists in the area of 3D printing, software and CAD/CAM, Mcor's vision is to make 3D printing more accessible to everyone. The company operates internationally from offices in Ireland, the UK and America.

www.mcortechnologies.com