

Is the Lighting Industry Ready for 3D Printing?

BY: ANN YOUNGBERG, LC, LEED AP

In recent years, 3D printing for design and manufacturing has gained attention as an on-trend topic in the tech field. While the medical, automotive, aerospace, construction, and fashion industries are just a few that have successfully utilized 3D

printing, Primera's Lighting Studio saw an opportunity to explore this rapidly growing technology, and recently worked with a lighting manufacturer for lighting in our new Chicago office space.

However, before we dive into our case study, let's review the basics of 3D printing technology. The formula required to yield a 3D product includes the use of raw materials (such as plastic, polymers, metal, or ceramics), CAD software, and a digital 3D design file. Often referred to as "additive manufacturing," 3D printing forms an object by adding one layer of material at a time. In contrast, traditional processing starts with a solid block or sheet of material which is cut, drilled, or machined off in a subtractive process. One of the more impactful benefits of 3D printing is the opportunity for design creativity with complex shapes, textures, color, and size. This is appealing especially when dealing with lighting fixtures.

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Primera embarked on the journey of beta testing to assist a manufacturer in vetting their 3D printing process in exchange for new lighting fixtures for our Chicago office. Specified fixtures were chosen to accent our reception area, break room, focus rooms, and department collaboration zones. First, we selected a size and shape that was fitting for the scale of each space. Next, we selected a finish using the finish kit provided, stacked with many colors, textures, and finishes. We decided to go with a few embossed small fixtures and a dual-sided finish combination for the largest fixtures, complete with a white outer fluted dome and gold interior. The fixture shades were to be 3D printed using a polymer material which is inherently strong and has the potential to be fully recyclable. The fixture selections were then sent off for production.





In addition to the new fixtures that would need installation, Primera brought an electrical contractor on board to handle some other miscellaneous office improvements. Once the construction schedule was laid out, we reviewed the function of each space and determined the lighting requirements of the fixtures. Again, there were many options for lumen output. After collaborating with the sales technical representatives, we had a full lighting package tailored to our specific needs. However, we ran into two setbacks while waiting for the product to arrive. First, there were some hang-ups with Underwriters Laboratories (UL) Listing protocols. UL Listing is the go to for independent product safety certification. The manufacturer was originally going to print from an office laboratory and then realized that they had to print from a manufacturing facility to obtain the UL Listing. There were also production delays in setting up and programming the large format printer for the larger fixtures. Luckily, the smaller fixtures were printed without an issue.

The second setback involved the large dome fixtures again. The dual color process made them less stable resulting in breakage during shipping. This was not anticipated by the manufacturer and consequently this color offering was removed from their line. This resulted in us having to compromise our design and reselect a single-color finish for the shade interior and exterior. The issue delayed our shipping time. Being that our contractor was already on site



completing other project work, we needed to come up with a quick work-around. Our solution was to install a smaller temporary shade as a placeholder on the large dome fixtures. It solved our immediate problem and could also be considered a method to ‘future proof’ other projects. For example, one could update pendant lighting by simply ordering new shades and replacing the old instead of purchasing completely new fixtures. Printing time could be as little as a few hours depending on quantities, and the existing LED fixture components would continue to function with a long life span.

Our large dome fixtures eventually arrived at the office and were swapped out within 15 minutes with the assistance of the product representative. Once all our fixtures were fully installed, we saw the difference it made in the overall scheme and aesthetics in our office. Overall, we were happy with the outcome of our 3D printing experience. While it did reveal some welcomed challenges, the opportunity to identify these issues fulfilled the objective of our

pilot program. It was mutually beneficial to Primera and the manufacturer as we both discovered what ran smoothly and what needed improvement.

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While lighting may not be as critical to life as, for example, a transplanted organ, it is important to our wellbeing and daily functioning, and we hope to continue seeing a rise in interest in 3D printing. Other markets already working with it tout a short lead time as one of its advantages. Usually, the printing equipment is local, in a manufacturing facility, allowing for a short shipping timetable. This is a plus considering the supply chain inconveniences we know today. Some have evolved and mastered their optimization processes so well that on-site manufacturing can occur when the printing



equipment is located on the project site. In the case of the lighting industry, however, we now know that UL Listing would need to be addressed before on-site manufacturing can be realized.

Additionally, current studies, such as those conducted at Rensselaer's Lighting Research Center, are exploring other components for 3D printing such as metal

heat sinks and secondary reflective or transmissive optics. There is promise that development of new applications for lighting products will lead to more 3D printable projects in the future and we are optimistic that lighting has a place alongside healthcare, automobiles, construction and aircraft in utilizing the expanding 3D printing technology.

About The Author



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Ann Youngberg, LC, LEED AP is one of Primera's in-house lighting design experts. With more than 26 years of experience, Ann blends her electrical engineering and interior design backgrounds together to provide a unique perspective and approach to lighting design projects. With a constant focus on client service, she's a detail oriented professional with a successful track record of wide-ranging projects in the architecture, engineering, and construction industry. She's skilled in Revit, AutoCAD, construction documentation, and lighting design and specifications.