CASE STUDY

How 3D Printing Casting Masters Saved $50,000 Annually

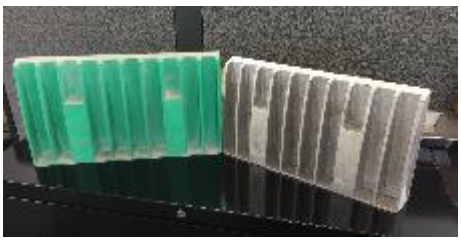
The large format of the 3D Platform printer allows for the creation of parts that could not be printed using previous methods. This 0.53m (21") diameter printed master easily fit on the 1m x 1m (39" x 39") print bed. [All Image Source: U.S. Architectural Lighting]

U.S. Architectural Lighting (www.usaltg.com) is a manufacturer of luminaries, along with outdoor site and area lighting options for a range of uses; such as, shopping centers, schools, parks, and industrial settings. Based in Palmdale, California, their product range boasts over 400 standard items, and additionally, they have the unique capability to offer customized solutions that are specifically designed with "the right combination of daytime aesthetics and nighttime performance." Beyond the look of a light, often it is meeting the technical challenges of rain, wind, snow, and sun in a specific setting that drives the need for quick results and new solutions.

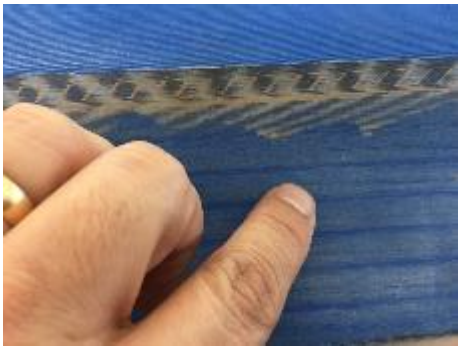
The development team at U.S. Architectural has implemented a large-format 3D Platform (www.3dplatform.com) FFF (fused filament fabrication) printer into their standard product development process for creating aluminum castings, and have found that they've gained two key advantages. They've increased the speed at which they can offer unique solutions and win business in custom designs, while at the same time cutting cost dramatically.

Tim Carraher, Lead Engineer at U.S. Architectural explained how his team had approached new designs prior to bringing a 3D Platform printer in house. "With our old process of product development, we used to spend on average $50,000 a year with an outside service bureau printing mostly SLA parts. The average part was over $3,000 and we would have to wait two to three weeks or more to get it in our hands."

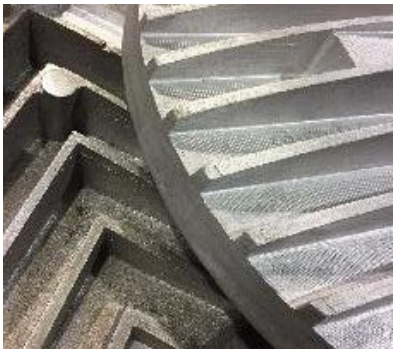
Tim estimates that in the 18 months they have been using the 3D Platform printer, they had completed 40 projects totaling 15 complete multiple part luminary designs. "The first few months we spent developing FFF 3D printing skills and had some success, but things really took off for us as we found the sweet spot and dialed it in. That's when the



3D printed PLA piece at left, aluminum casting at right.



The FFF 3D-printed PLA piece has an acceptable surface finish with only minimal filling and sanding required.



On the right is the 3D-printed PLA piece, with the first run aluminum casting on the left.

machine began to make a big impact for us. In what we saved versus going outside to have things printed, the machine paid for itself within six months."

At an average cost of $3,000 per part, the 40 projects would have totaled $120,000 spent in 18 months. With an installed cost of about $30,000, it means that in that timeframe having the 3D Platform printer has added about $90,000 to the bottom line.

Their process begins with the CAD model being printed on the 3D Platform printer using a standard PLA filament. At times, they segmented the model and print only a section of a part to test the printability of a geometry or to quick cast a portion for testing before ever going to the foundry. They've also found that the PLA parts printed via the FFF process are stronger and not fragile like the SLA parts previously used. Once the PLA print is completed, they spend minimal time filling ridges in the part with a body filler and sanding it smooth.

The filled and sanded PLA part is taken to the prototype shop where they manually press the part into a type of self-binding "green sand" to create the temporary match plate pattern. Next, they pour the aluminum into the sand, quickly producing the first metal prototype.

Upon removal of the part is where the process plays to U.S. Architectural's strength in metal finishing as they work the aluminum part to achieve the desired final surface finish.

"We've found that trying to sand the PLA, while possible, can be risky. We tried using a tool on it, ended up putting a hole in the part, and then had to start over. So, we find it's much easier for the little finish work we need to do to use a die grinder or other tool on the aluminum," Tim explained.

Once the aluminum part is accepted, it goes on to the foundry and becomes the master used in creating the production level cope and drag pattern.

The large-format FFF 3D printer from 3D Platform allows the entire process from CAD design, to 3D-printed piece, to the quickly cast aluminum first part to now happen in a matter of days, not weeks. This gives U.S. Architectural a competitive speed advantage and eliminates the outside cost for prototype prints.

3D printed piece

Casted aluminum piece