

Rapid Application Group Doubles Capacity with Figure 4™ Standalone

Veteran-owned full production additive manufacturing service bureau grows business and reputation with high quality DLP parts.

Terry Hill is a U.S. veteran and entrepreneur who was so convinced of the value of additive manufacturing that he resigned from his job after the Army to prove its potential. In 2017 he founded Rapid Application Group, LLC, out of his home office. Since opening its doors, the company has grown exponentially, experiencing 300% growth in its second year to become one of Oklahoma's fastest growing companies.

Rapid Application Group is a full production additive manufacturing service bureau providing mission-critical and time-sensitive support to customers in the oil, gas, motorsports, healthcare and aerospace and defense sectors. Based in Broken Arrow, Oklahoma, the service bureau has over 25 years of collective experience in additive manufacturing and is a subject matter expert in Selective Laser Sintering (SLS), Fused Deposition Modeling (FDM), Digital Light Printing (DLP), Multijet Printing (MJP) and Direct Metal Printing (DMP) with supplemental access to a complete range

CHALLENGE:

Cost-effectively increase production capacity and speed-to-market with injection-molded part quality.

SOLUTION:

3D Systems' Figure 4™ Standalone 3D printer with 3D Sprint® software and Figure 4™ TOUGH-GRY 15 material.

RESULTS:

- Doubled production capacity since installation
- Return on investment within months
- Simple Figure 4 calibration process provides trusted six sigma repeatability
- Parts in 30-45 minutes compared to more than 7 hours
- 3D Sprint software facilitates file fixing across in-house printer fleet
- Figure 4 TOUGH-GRY 15 material delivers exceptional surface quality that rivals traditional mold manufacturing

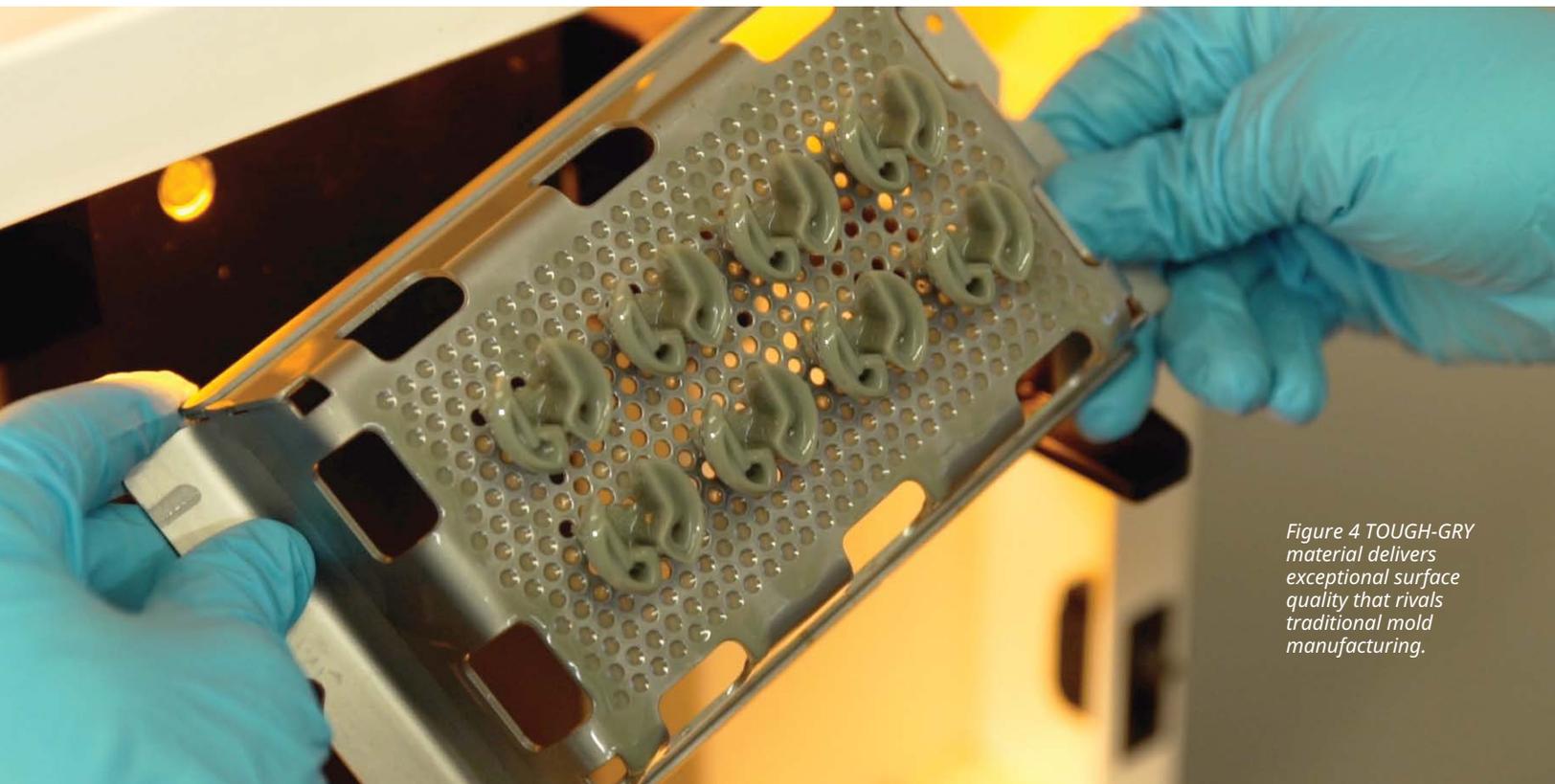
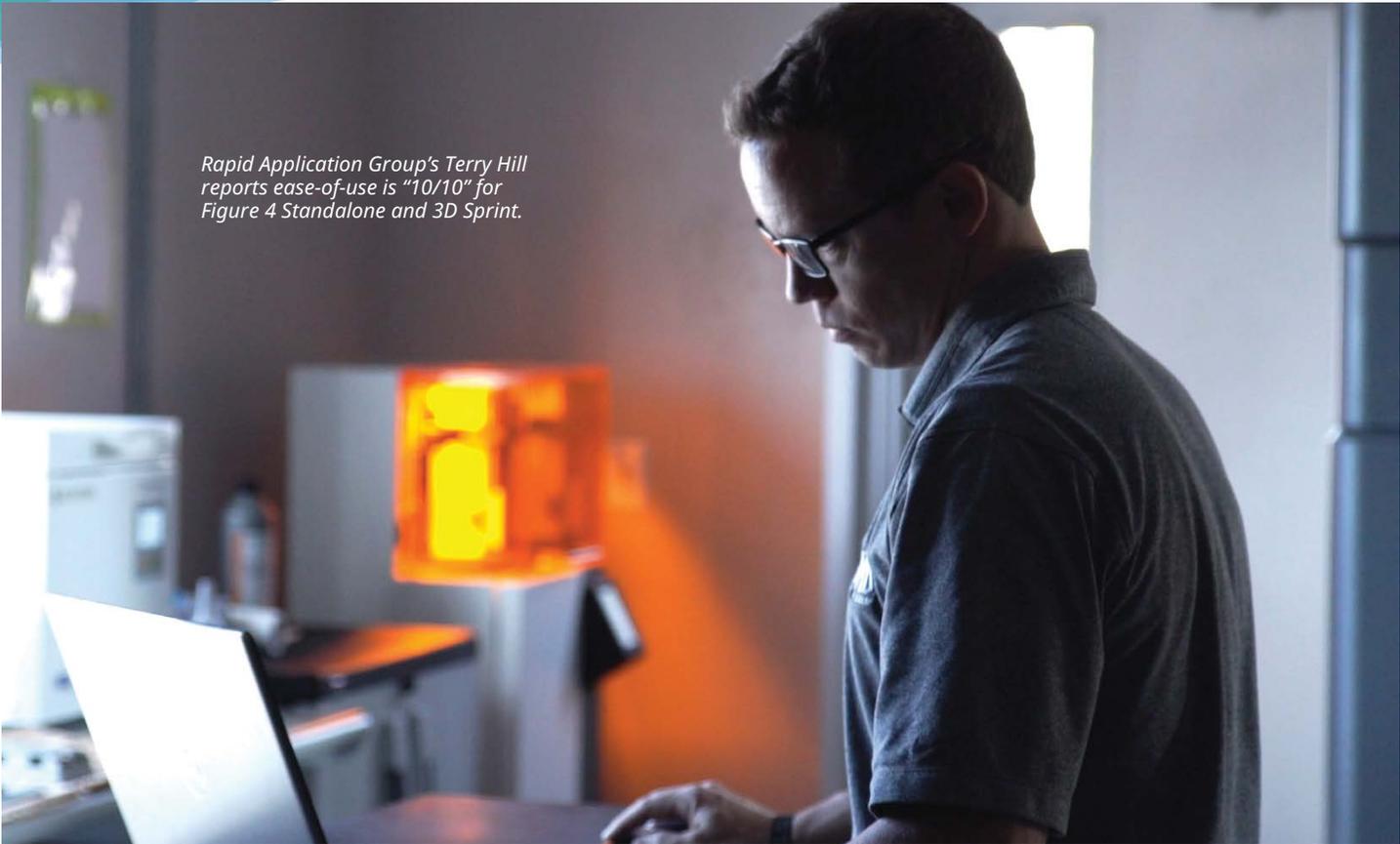


Figure 4 TOUGH-GRY material delivers exceptional surface quality that rivals traditional mold manufacturing.



Rapid Application Group's Terry Hill reports ease-of-use is "10/10" for Figure 4 Standalone and 3D Sprint.

of additive manufacturing technologies through 3D Systems On Demand. Prior to founding Rapid Application Group, Hill spent 13 years in the U.S. Army as an engineer and aviator, and Rapid Application Group is a certified Service-Disabled Veteran-Owned Small Business.

Given the incredible growth of the business, Hill began looking for a cost-effective way to increase his production capacity. He cites the purchase of 3D Systems' Figure 4™ technology as a game-changing decision for the success of his business. In addition to ease of operation and the ability to produce fast, reliable output at low cost, Figure 4 Standalone paid for itself and doubled Rapid Application Group's production capacity for high quality small parts in just a few months.

Figure 4 Standalone delivers ROI within months of installation

Rapid Application Group's motivation behind purchasing the Figure 4 Standalone was driven by the desire to cost-effectively increase capacity while maintaining part quality. In selecting which machine to bring on, Hill looked at speed-to-market, repeatability, part surface finish, and system cost. After seeing Figure 4 at the Rapid + TCT trade show, Hill said his decision was a "no brainer." According to Hill, the things that first impressed him about the machine were how compact, powerful and moveable it was. "I wanted something that I could possibly move into a different area or add onto," he says. "It was an easy purchase decision."

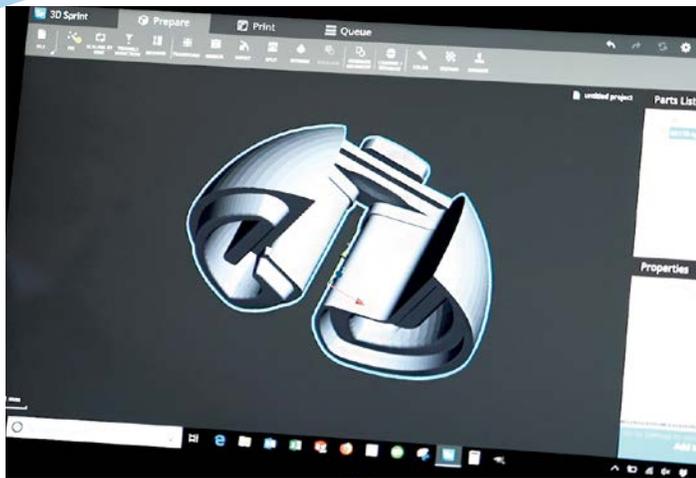
Within a few hours of unboxing, Rapid Application Group was up and running. Figure 4 can be calibrated to achieve the tolerance requirements for six sigma repeatability.

"The repeatability of Figure 4 is a big deal for me," says Hill. "I know that I can load a file and walk away, and when I come back the parts will be exactly like the print before, which is critical to maintaining our quality standards and production schedules. The Figure 4 Standalone doubled our capacity on highly detailed small parts and paid for itself within a matter of months."

Fast and easy 3D printing, high quality production parts

The ability to quickly and easily start new prints is important across applications and industries, but it directly impacts the bottom line in the service bureau environment. The time and complexity of every stage affects overall productivity, from receiving and quoting parts to fixing files, sending parts to print, and ensuring quality. "Of all the technologies we have in the company, Figure 4 Standalone is by far the easiest and fastest to use," Hill says. "Coupled with 3D Sprint, it delivers the perfect storm of repeatability and has completely opened capacity inside the company."

With Figure 4 Standalone, Rapid Application Group is able to produce high quality parts with shorter lead times than ever before. Once a print is complete, achieving a final part is a simple process of removing supports, rinsing the part, and running it through a cycle in the UV curing station.



Rapid Application Group uses 3D Sprint to prepare files for all of its 3D printers.

"When I receive a file first thing in the morning, it can be on the printer by lunch, and I can have a part in hand within 30–45 minutes," Hill says. A comparable part would take nearly seven hours on other systems.

3D Sprint workflow keeps production in motion across systems

3D Sprint includes a wide range of tools that facilitate the 3D printing process from start to finish. From file manipulation, quality control and file preparation to print management, Hill says the speed and ease of the 3D Sprint workflow has helped Rapid Application Group shrink the time it takes to provide quotes to customers and send jobs to the machine. "All of the different functionalities of 3D Sprint plus the ability to send files to the printer without having to physically transfer them with a thumb drive has really accelerated our operation," he says.

The additive manufacturing software also helps Rapid Application Group fast track necessary file repairs by identifying and offering solutions to potential problem areas within files. "It's a great tool to keep our production flow moving," Hill says.

The algorithm-based Smart Supports tool offers the option to generate support structures that minimize material usage while optimizing placement. It is also possible to override Smart Supports and assign structures manually: "3D Sprint gives you that latitude. I can do almost everything I need to in 3D Sprint," Hill says.

Due to the ease and speed of the 3D Sprint workflow, Rapid Application Group uses the software to prepare files for all of its 3D printers, with the added benefit that it allows quick shifts from one 3D Systems printer to another. "Ease-of-use is ten out of ten," Hill says. He has also found it very easy to teach other operators, which has facilitated user training.

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Injection-molded surface quality with Figure 4 TOUGH-GRY 15 material

According to Hill, the surface quality of Figure 4 parts is so comparable to injection-molded parts that several of his customers have asked him to clarify the production process upon delivery. "I've had customers tell me it looked like we injection molded parts that were actually printed," Hill says. "In surface quality, strength characteristics and speed of parts delivery, Figure 4 Standalone has helped us excel. It's like 3D Systems took an injection molding machine and stuffed it into a two-by-two foot space."

For example, Rapid Application Group worked with a medical device company to produce a new version of a component that was continually breaking and causing maintenance issues with routine use. Rapid Application Group 3D printed the new component using Figure 4 Standalone and Figure 4 TOUGH-GRY 15 material and subjected it to a series of qualification tests. Although specifications required the component be able to withstand a seven-foot drop, Hill took things a step further and instead launched the parts into the dry wall in his workshop: "The parts embedded into the dry wall and came back out completely intact," he says.

Using Figure 4, Rapid Application Group was able to secure a sole-source contract with the medical device company to provide these improved parts. As for the device company, maintenance on the machine that incorporates the 3D printed part has been reduced substantially, enabling it to extend its warranty. "It's been a huge success for everyone," Hill says.

Opening a full production additive manufacturing service bureau

Hill was first exposed to additive manufacturing in 2015 when he invented the Hill Helmet mount for U.S. flight helmets as a research pilot at the Aeromedical Research



Figure 4 TOUGH-GRY material delivers injection-molded part quality.

Laboratory. The lab was outfitted with a small 3D printer that Hill says made the proverbial light bulb go off: "From my first interaction with AM, I knew it was something that I needed to be a part of," he says.

Once out of the Army, Hill was selected to serve as director of business development for a global aerospace company where he program managed the implementation of additive manufacturing, robotic welding and automation. He identified additive manufacturing as the stepping stone capability the company needed to move from where it was to where it wanted to be, but due to timing and finances, the program was not pursued. However, Hill's confidence in the technology did not waver. He resigned from the company to found Rapid Application Group.

Today Rapid Application Group supports high- and low-volume production parts across a complete range of additive technologies. It is a certified Service-Disabled Veteran-Owned Small Business, with additional HUBzone, ITAR, and NaVOBA certifications, and is AS9100D/ ISO9001 compliant, with anticipated certification in Q1 2019. With fast and continuing success, Hill says Rapid Application Group does not exist to compete with other manufacturing businesses, but is instead a company of helpers. "We are here to provide capacity immediately through additive manufacturing," he says.

Transforming lives for veterans with 3D printing

Hill's vision goes beyond answering the needs of his customers to answering the needs of his fellow veterans. After leaving the Army, Hill was challenged with transitioning back to civilian life. Through his business he saw an opportunity to help fellow veterans reestablish themselves and has started a Veterans to Additive Manufacturing certification program to train veterans with marketable skills.

The Veterans to Additive Manufacturing program is a structured curriculum offered to veterans that covers conceptual and practical topics across the complete AM part production workflow, from loading printers to quality control. Hill says the drive to help others is a part of him that he felt intrinsically connected to while in the Army, and which he seeks to keep active in civilian life. The education program



Figure 4 Standalone produces fast, reliable, high quality 3D printed parts.

is designed to help veterans get marketable job skills that they can continue to use within Rapid Application Group or take with them elsewhere based on their goals. Hill has also established a Fundamentals of Additive Manufacturing Certificate for local high school students and troubled youth. "We have a corporate responsibility to care for the next generation and plant the seed for innovation through additive manufacturing," Hill says.

Hill has even used additive manufacturing to help the four-legged friends that help him. Using the Figure 4 3D printer and Figure 4 TOUGH-GRY 15 material, Hill coordinated with other organizations to design and deliver a prosthetic leg for his service dog's sister, Honor. Stationed at the Veterans Association, Honor had difficulty getting around due to damage to her back left paw. The durability and surface finish of the Figure 4 material made it the right match for the application, and the speed of the Figure 4 system limited the time Honor would be away from the veterans who missed her.

"I think our drive to help others is one of the reasons Rapid Application Group is growing so quickly," Hill says. "I've never believed in wishing things were different, but I will absolutely put in the work that's required for change."



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