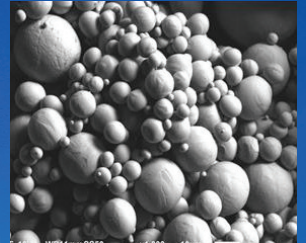


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i3D MFG Specializes in Metal 3D Printing Serving The Aerospace & Defense Industries

Additive Manufacturing OEM EOS Is Their Partner

i3D MFG™ is a relatively young company that is doing extraordinary things. In just its 4th year of business, the ITAR registered company supports some of the largest aerospace customers with cost-effective, small batch, complex and high-value metal parts – parts that are manufactured with 3D (additive) technology. The company is in the process of certifying to AS9100 Rev. D, with plans to achieve this in Q3.



“We take 3D models and lay extremely thin layers of the powdered metals, then weld the micron layers together. It comes out denser than a cast part.”

Erin Stone, CEO

Today the company is co-owned by a team of 4, 3 who run the day-to-day business, and the 4th is an investment partner. The 3 active owners include founders Erin Stone and Matt Garrett, and Chad Cooper, who joined the company shortly after it opened for business. All 3 owners bring decades of manufacturing and technical sales expertise to their company. Collectively, they have over 50 years of management level experience. Erin describes i3D’s decision to launch a DMLS start-up, “3D metal printing has emerged as a critical component in aerospace, rocket, and UAV design and manufacturing, but until i3D began in 2014, companies in the Western US were forced to use DMLS services thousands of miles away, reducing some of the lead time and cost advantages 3D printing is known for.”

Chad explains, “What differentiates i3D MFG from other 3D manufacturing entities who specialize in prototypes only is the technology we use. It is called ‘Direct Metal Laser Sintering’ (DMLS), also referred to as Direct Metal Laser Melting (DMLM), and it moves 3D printing from the prototyping realm into true production parts manufacturing. DMLS parts are typically characterized as having strength, hardness and durability that is, at the least, comparable to cast or forged parts in comparable metal.” Chad adds, “Today, DMLS parts are used in final assemblies by NASA, the Army, the Air Force, Boeing, Lockheed Martin, GE, L3 and BAE, and these are some of our customers. DMLS is perfectly suited for aerospace and UAV thermal, weight reduction and complex part requirements. Generally, 3D metal printing holds tolerances off the printer as tight as +/- .002, and prints densities above 99%, making tighter tolerances and post process

requirements easily achievable. At i3D, we also manufacture parts for medical and dental device applications, firearms accessory manufacturers, the energy and recreational gear industries, and automotive parts users.”

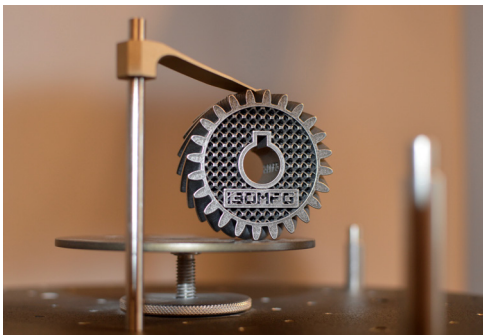


i3D MFG is so proficient in DMLS that 3D manufacturer EOS designated the company a ‘North America Material Process Partner’. This gives them access to the latest DMLS machine parameter sets, and it enables the company to develop custom powders or ‘recipes’ for their customers. Their expertise has been called on by the US Air Force to publish a chapter in their manual for Additive Manufacturing.

Regarding the process itself, Matt explains “As opposed to traditional, or subtractive manufacturing where parts are carved out of billet, the additive manufacturing process starts with 20-40 micron layers of powdered metal and uses a laser to melt thousands of micro layers together, one layer at a time based on a 3D CAD model – adding material only where the model dictates. DMLS enables production parts to be built that cannot be traditionally manufactured, including weight reductions through lattice and honeycomb structures, conformal cooling channels, and single part builds of multi-part assemblies.” i3D prints stock metals including Titanium, Aluminum, Inconel, Monel K500, Haynes 282, 4 medical grade Stainless Steels, and Maraging Tool Steel as well as custom powders created for specific customer applications. Matt says that since there is no material waste and the ability to reduce assembly components, DMLS printing can reduce the cost of parts made from exotic metals like Titanium and Inconel by 50- 70%.

Parts and small batch test runs can be 3D printed impressively fast and post-processed to meet finish requirements in days. Multiple design iterations are possible within the same build allowing a shorter design time-line. This type of nimble market reaction time gives i3D clients a competitive advantage in market testing, product improvement reaction time, and JIT delivery.

i3D MFG opened for business with 1 EOS M280 (DMLS) machine. Just 4 short years later, the company now owns 5 EOS DMLS machines. How did a start up grow to 5 DMLS machines, one could ask, as these machines are



quite costly. Optimism and hard work meet preparedness, that's how. Early on, the company was awarded funds through a program called the 'New Market Tax Credit Program' (NMTC). The NMTC Program is a US Department of Treasury program that incentivizes community development and economic growth through the use of tax credits that attract private investment to distressed communities. i3D MFG opened for business in The Dalles, Oregon, about an hour from Portland, because the city qualified for the NMTC program.

i3D MFG didn't expand their business with new DMLS machines just to increase capacity. Rather, they did it to increase turnaround time for their customers and to increase their portfolio of offerings. Matt says, "We now offer 3D printing of 15 different stock metal powders, and for our most heavily utilized metal powders, we have dedicated DMLS machines. (Powder handling is critical, Matt says, as cross contamination is unacceptable, and to prevent this, it can take hours to remove the previously used powder prior to printing with a new metal powder). Through the use of 5 DMLS machines, i3D eliminates the need to constantly clean the machines of the previously used metal powder, creating nimble response time and creating cost efficiencies.

i3D offers 'Design-for-3D-Expertise' to its customers. "The company's proposals for manufacturing are not optimally done over Internet quoting", Erin describes, expanding, "At i3D, we closely assist our clients' designers and engineers in Design-for-3D manufacturing. Design-for-3D manufacturing creates limitless new opportunities for game-changing new parts and efficiencies."

i3D MFG is equipped with in-house finishing equipment specifically chosen to efficiently remove support material and deliver a professional quality part. The finishing shop includes heat treat, wire EDM, drilling, tapping, tumbling, ultrasonic cleaning and blasting equipment. Their expanding quality department is stocked with necessary measurement tools and a 3D scanner used to assure customers they are receiving a conforming product. Matt clarifies, "3D doesn't per se compete with traditional or subtractive manufacturing — rather it is complimentary and often the two manufacturing methodologies are best suited for specific applications." That being said, i3D MFG has partnered with a machine shop in Montana, Thompson



Precision, for reciprocal machining arrangements. Chad adds, "We encourage other machine shops to contact us for synergistic business opportunities."

The i3D team isn't just passionate about 3D additive manufacturing — they are also passionate about their home state of Oregon. In fact, each of the DMLS machines are named after rivers in Oregon, and the partners say in jest that when they have named their machines for all of the rivers in Oregon, they will be moving on to names of mountains and lakes next! (There are somewhere between 37 and 59 — some numbers count creeks, and some use 'forks' on given rivers to double or triple count).

"The partners have been a part of companies that moved manufacturing from the United States to China, or to other low-labor cost countries. We started i3D MFG because we want to participate in the reshoring initiative that is taking place today", Erin says, adding, "We are proud to bring new jobs into the industry through i3D MFG, and these aren't minimum wage jobs — the team we continue to grow is experienced in engineering and design, and they earn a true family wage and benefits."

There are so many reasons to contact i3D MFG. If you have complex parts that can benefit from 3D manufacturing, contact them at 541.588.0986 or visit their website at i3DMFG.com. You will find a wealth of information on 3D DMLS printing in their online library. And if you are looking for a fast paced, exciting opportunity to take your talents to the next level at an entrepreneurial company, contact them through their website at i3DMFG.com

EOS and i3D MFG™ Push the Aerospace Industry Forward with Industrial 3D Printing

As companies across industries continue to explore how to bring the factory of the future to life, aerospace has become one of the early adopters of additive manufacturing (AM), which offers increasingly efficient, effective, and reliable manufacturing methods for

Continued Next Page



complex parts. EOS, the global technology and quality leader for high-end 3D printing (AM) solutions, has almost 30 years of experience in this field, and uses their unique combination of systems services and processes to enable their partners to manufacture parts, tools and components with more efficiency and design freedom than ever before.

In the aerospace industry specifically, EOS is teaming up with innovative companies like i3D MFG to manufacture critical components for the aerospace industry that would previously have been impossible using traditional manufacturing methods. Through Direct Metal Laser Sintering (DMLS), EOS' metal, or 'M' series, machines use lasers to create parts additively, melting metal powder together to form intricate designs created through CAD data and programs. This technology has been instrumental in shifting industrial 3D printing from prototyping-only to production of actual parts in the aerospace industry given the strength, hardness, and durability of parts equal to that in subtractive manufacturing, while part design creativity is significantly improved.

"DMLS functions as a no-waste process, enabling parts to be built that cannot be traditionally manufactured, including complex geometries, conformal channels, and single part builds of multi-part assemblies," says Matt Garrett, one of i3D MFG founding members. "DMLS is perfectly suited for aerospace and UAV thermal, weight reduction and complex part requirements and the possibilities for this technology are endless."

i3D MFG currently uses EOS' metal machines to decrease turnaround time and cost in part production for their customers around the globe – EOS' global footprint and expertise are another reason they serve as a strong partner. In addition, EOS' extensive library of metal materials available for use ensure i3D MFG can accommodate a range of manufacturing requests on behalf of their diverse customer base. EOS machines use aluminum, maraging steel, high-grade steel, nickel, and



cobalt chrome alloys. Uses for each material creates advantages such as lightweighting components that reduces fuel consumption, material costs and CO2 emissions.

"EOS' DMLS machines have empowered our partners in the aerospace industry with unprecedented flexibility in design and engineering that enables them to produce the same part with weight reduction of about 40-60 percent," said Scott Killian, emerging technology business manager at EOS North America. "Using this technology, partners like i3D MFG can help their customers produce products that consume significantly less fuel and emit less carbon dioxide due to manufacturing efficiencies. These enhancements translate directly into cost-savings."

And lightweighting is just one of the uses for DMLS. This technique allows a toolless production which requires less energy and raw material than conventional manufacturing. Traditional techniques that use wax molds have restrictions that limit production to 20 units per day. The DMLS process does not require tools or molds, enabling independence from batch sizes, which is also an important element in the aerospace field.

"Since our technology uses CAD data and digital designs, our customers have the freedom to produce anywhere from one to thousands of parts in one day," adds Killian. "Innovative companies like i3D MFG that are growing at a rapid pace and challenging the status quo can shorten the time they spend in R&D and bring their innovations to market quicker than ever."

Since launching as a startup in 2013, i3D MFG now houses five EOS DMLS machines and works with several top government and private aerospace companies. EOS collaborated closely with i3D MFG to ensure the right mix of machines and materials were in place, giving i3D MFG's customers a distinct competitive edge.

Aerospace companies like i3D MFG see the potential in future-facing manufacturing technology that upend limitations inherent in conventional manufacturing, and are bringing these solutions to bear for their customers at a breakneck pace.

Anyone who would like to learn more or speak with an EOS representative should reach out to: <https://www.eos.info/contact>.