



Metal Technology (MTI) forges new path with metal 3D printing and English Racing

Albany, Oregon has been a hotbed of metallurgical distinction since 1943 when President Franklin D. Roosevelt announced that the U.S. Bureau of Mines had selected the site in Albany to begin researching methods to create zirconium and titanium alloys. That decision provided the impetus for a thriving industry built on developing alloy systems designed to meet extreme applications.

Metal Technology (MTI) of Albany has made its name through developing Aerospace and Defense applications which have included manufacturing components for the Trident missile programs and various space exploration initiatives. MTI has positioned itself in the global metals industry as a dependable innovator. Now, MTI is expanding the paradigm of metal parts design and manufacturing through the use of 3D metal printing, and is reaching out to new markets.

As a keystone of the company's effort to reshape how metal parts are made, MTI has made the leap into additive manufacturing, adding the 3D Systems ProX™ 300 Direct Metal Printing (DMP) 3D printer to its capabilities portfolio. The ProX 300 uses a laser sintering process to produce chemically pure, fully dense, precise metal parts with a level of speed and complexity that's unmatched in traditional manufacturing processes.

One of MTI's key strategies with the newly added ProX 300 is to transfer its vast metals experience to new industries and applications. So when a motor sports opportunity came up this year—a case that was perfect for the ProX 300—the team was all over it.

Gary Cosmer, MTI's CEO, who is a motor sports aficionado himself, spending much of his free time participating in motorsports activities, quickly recognized the value proposition that 3D printed parts will play in the motor sports market.

Cosmer notes, "Prior to 3D printed metal components, the costs of designing and fabricating "one off" or small lots of parts or components was prohibitive in most cases. 3D printing also opens up a whole new way of thinking about the design of components, where printed parts allow for higher complexity and more complex features that allow significant weight savings or enhanced flowability for cooling within the component."

In neighboring Washington state, English Racing was struggling with their Mitsubishi 4G63 race engines. The high-performance cars that English Racing puts on the track, especially the Mitsubishi Evo, set up for ½ mile top-speed events where the vehicle runs in excess of 185 MPH; in less than ½ mile, the RPMs exceed 10,000. The factory oil pump drive pulley translated those increased RPMs into excessive oil pressure, a situation where complete engine failure can quickly follow.





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English Racing had an innovative approach to the problem using a new pulley with a larger diameter, which would turn slower and thereby lower the oil pressure. But producing it was a huge challenge: The original pulley was a cast part, which would typically require a mold, tooling to produce a mold, a significant amount of lead time and a prohibitive amount of money.

Trying unsuccessfully to produce this part for over two years, English Racing saw no relief in sight. So when, in early 2014, the company discovered MTI, they were able to quickly prepare the design data for 3D printing, and produce the part on the ProX 300. The initial working prototype took only 5 hours to print.

Within 3 days, that part was installed on the Mitsubishi Evo race car and running on track. The part worked perfectly, reducing oil pressure to safe levels and allowing the vehicle to set speed records in its class.

"The ProX 300 allowed us to produce end-use parts faster and more economically than ever before, and these parts are being used in some of the most demanding environments you can imagine." Said Cosmer. "By printing the part we were also able to include features and design parameters that could not be done with traditional methods. In the matrix of component complexity and manufacturing speed and cost, the ProX 300 allows us to bridge that gap for our customers."



After the first part was built and tested, they used the ProX 300 for a production run of 35 additional parts for different race applications across the country.

On June 27th, 2014, the English Racing team put its newly designed oil pump pulley to the test at the Pikes Peak ½ mile top-speed event and achieved 184.9 mile per hour placing first place in the Sedan Class. "The car ran great like we expected it would," said Zach Morgan, Technician & Tuner for English Racing. "We have been running the car on our dynometer without any failures so we thought we had a car that was going to put us in the winners' circle, we just didn't know if that was going to be first place or not. The team is stoked!"

"The ProX 300 was perfect for this job, in total we spent 130 hours on the project that was pretty substantial," said Cosmer.





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The quantity, geometry, and features that would have been difficult to produce any other way—made it an ideal application for DMS on the ProX 300. MTI was able to make short work of a project that had been in the works for years, saving English Racing thousands of dollars and significant time over other manufacturing processes.

"The entire metals industry is on a learning curve in terms of input material, and this is only going to improve," said Cosmer. "MTI is leading and driving that learning curve and excited to be pushing the envelope in 3D printed metal. We don't consider this a trivial pursuit."

Addendum: On July 13, 2014, the Mitsubishi Evo with its 3D printed metal underdrive oil pump pulley took first place and record holder as the fastest 4-Door vehicle with a top speed of 196.6783 MPH.

About Metal Technology (MTI)

With more than forty years' experience applying innovative, proprietary technologies, Metal Technology (MTI) is making possible the use of difficult alloys for a wider range of applications with greater efficiency, versatility, and reliability. Alloys include Tantalum, Niobium, Zirconium, Titanium, Tungsten, Nickel, Inconel, Molybdenum, and Vanadium. MTI uses specialized additive manufacturing, deep-draw, spinning, forging, machining, EDM, and fabrication methods to deliver superior products according to your exacting specifications. MTI produces components for ion source components, targets, seamless crucibles, explosively formed penetrators, tubing and vessels as well as custom parts that go beyond common configurations.

Visit the company's website to learn more: www.mtialbany.com

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