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FASTER NYLON PARTS – A New Age for 3D Printing A RAPIDMADE WHITE PAPER

By Mark Eaton

Getting parts on demand has been a manufacturer's dream for many years. Since 2005, [see M. Park, UNSW article](#), there have been cries from the 3D printing industry that additive technology would replace the need for injection mold tooling, that it would eliminate the need for machining, that casting would become obsolete. Finally, that dream is becoming a reality.

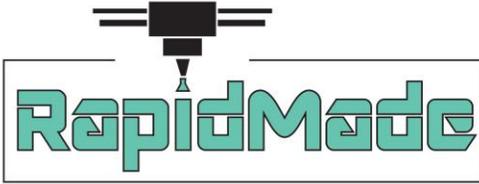
While there have been success stories such as the use of Stratasys Ultem for aerospace parts and selective laser sintering (SLS) nylon for automotive parts, until today, these components have all had restrictions on where and how they could be used. One of the biggest drivers for this has been the speed and the part cost. [Siemens](#), according to a recent article in *Plastics Today*, is using 3D printed fire, smoke and toxicity-compliant polymers to replace parts in trams, and they cite part availability as being the primary driver. The [US Marines](#) have recently experimented with printing replacement Humvee parts in the field. What all these examples have in common is they are limited in scope by the 3D printing technology restrictions. While the FDM process eliminates tooling, it is still 100x slower than injection molding or machining, and while SLS material prices have been reduced, they are still 10x more expensive than injection molding or nylon bar stock prices. So, the extent to which these older 3D processes can be deployed is still limited by cost and speed.



Photo Credit: HP

This is beginning to change. A new breed of additive manufacturers is arriving on the market who are focused on truly using 3D printing to create production parts at costs comparable to injection molding and machining prices. These "new age" additive manufacturing companies combine faster printing technology with engineering resources to convert and certify part performance. They have integrated

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quality systems to ensure material, process and part conformity. And they offer parts at competitive prices compared to injection molding or machining costs without the need for tooling, set-up costs or inventory carrying costs. An example of one company taking advantage of this new age in additive manufacturing is [Daimler](#), cited in a recent Reuters report, who has announced it will start offering plastic replacement parts printed at local service centers from a library of 3D files.



Driver's armrest is 3D-printed from FST-compliant thermoplastic resin.

Picture credit: PlasticsToday.com

As an executive board member in the additive manufacturing community, I recently got to profile one such Portland-based 3D printing company, [RapidMade](#). After 6 years developing prototyping, tooling and engineering services to support 3D printing, this company is reinventing itself to use the new breed of additive technology being offered by companies such as Hewlett Packard and Carbon 3D. These companies have developed much faster 3D printing technologies that use faster curing, less expensive materials with all the properties of traditional polymers. The new [HP MJF](#) is being showcased by RapidMade as part of its expansion in 2017. With speeds that are 10x faster than current SLS technology and material prices equivalent to injection molded nylon or machined bar stock, RapidMade can now offer its customers a wide range of new and replacement part solutions. Where precision tolerances are required, the company uses automated machining centers linked with the printers to provide finishing operations.

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Photo Credit: HP

Without the need for tooling, customers can now order parts to print using their 3D library or one provided by the service provider. The shorter printing cycle times mean that it is no longer necessary to hold more than 1-2 days' inventory for quick use parts, and less frequently used parts can be ordered as needed with zero inventory requirements. For very low order quantities (less than 10 parts), it has always generally been cheaper to 3D print versus using traditional manufacturing. With the lower cost breakeven point of these new age 3D printing technologies, minimum order quantities (MOQ) of 500 or 1,000 will be converted to printing versus injection molding or machining. For customers already using SLS technology, they will see an immediate cost and turnaround benefit from switching to this new breed of 3D printing technologies.

The benefit of these "new age" additive manufacturing companies like RapidMade is being immediately felt by the machinery manufacturers and end users of such equipment. There is a significant cost benefit in current supply chains, [PWC Strategy&](#) estimates there will be a 20% gain in TCO (total cost of ownership) from 3D printing replacement parts. It is estimated 70-80% of that can be delivered to the end users when they engage with a "new age" additive manufacturing company. Lower prices for spare and replacement parts are possible with piece of mind that the part has been certified for use. No longer are machinery manufacturers tied to traditional injection molders who retain tooling that cannot be easily moved. Parts produced offshore can now be re-shored without needing to recreate tooling. [PWC Strategy&](#) predicts German spare parts manufacturers will derive \$3Bn in benefit from adopting 3D printing. Additive manufacturing by its nature is a non-labor intensive process, and the new breed of technologies produces 10x the number of parts in the same time lowering the overhead cost per part

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and making larger MOQ more attractive. Companies like RapidMade retain digital libraries and ship direct, on demand parts in quantities of 1 to 1,000 in less than 24 hours. They do this by not only having faster 3D printing technologies but also using automated transaction systems, integrated engineering and lean techniques to optimize printing uptime.

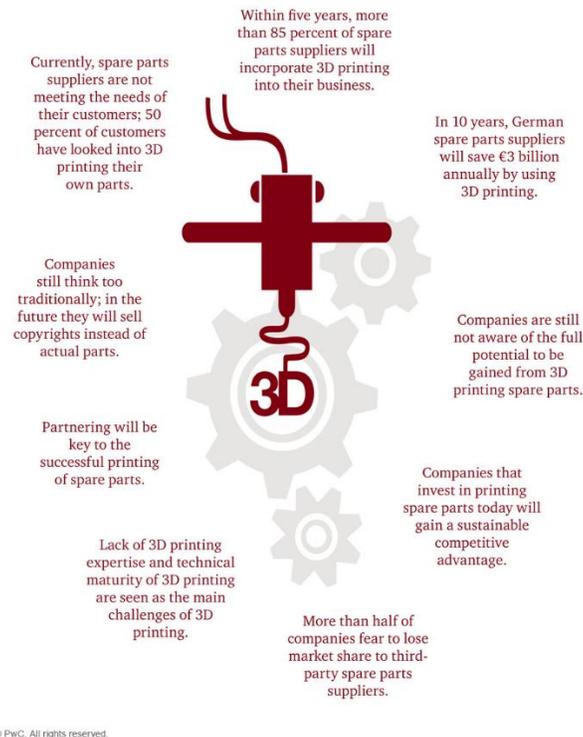


Photo Credit: PwC

Whether it is Daimler, deciding to print plastic parts locally to save warehouse, shipping and logistics costs or Siemens citing the increased ability to service multiple customers with parts on demand, times are changing for the benefit of producers and end users. And to support the changing demands, these companies are turning to the 'new age' additive manufacturers who, in turn, are enabling US companies to re-shore production, improve turnaround time and lower part costs. If you have dismissed 3D printing in the past, it might be time to take another look.

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