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### 3D Printers vs. RPM Service Bureaus

In the early 90s when I was a freshman in the RP industry I attended many SLA Users Group meetings. I was exposed to many things at those meetings including many of the key players in this young, revolutionary industry. Some of these key players were entrepreneurs, some were employees of major companies and some were visionaries - dreamers as I recall thinking back then. I remember attending those meetings looking for practical solutions to problems I was facing that day . that week back at my RP lab. I used to laugh and dismiss ideas like an under \$3000.00+desktop printer. I am not laughing anymore now that those dreams and visions have become a reality. The question among industry professionals is this: Does the existence or rather the availability of an affordable, user friendly desktop printer have any impact on the amount of business done by service bureaus?

From 2003-2006, 68% of all additive manufacturing systems installed were 3D printers. 77.4% of those sales were by Stratasys and ZCorp (Wohlers, Terry, *Wohlers Report 2007, May 2007*). These percentages might make a service bureau uneasy if it were not for the steady growth they experienced from 3.9% in 2003 to 11.7% in 2007(Wohlers, Terry; *Wohlers Report 2007, May 2007*). American Precision Prototyping surveys show most customers own some sort of desktop printer but they still buy parts from service bureaus -lots of them. We can explain this phenomenon by examining part size, material selection, accuracy and custom finishes.

With that in mind, let's examine a few leading 3D printers and their technologies. Zcorp printers utilize standard inkjet printing technology to produce models from a powder based material in either color or monochrome. This technology yields a resolution of up to 600 dpi and builds with a layer thickness of around .004+. These printers can produce models up to 10x14x8+and can be produced from a variety of lower end materials. These materials are not designed with the same mechanical properties as the materials utilized by the SLA<sup>®</sup> & SLS<sup>®</sup>. They are a blend of powder, binder, infiltrant and other components that merely simulate the actual material. Stratasys offers customers ABS parts from their Dimension 3D printers utilizing the FDMi build technology. These printers can produce models up to 10x10x12 inches in size with a resolution of .010+. Dimension printers typically yield quick but inaccurate parts. 3D Systems has recently launched the VFlash Desktop Printer which utilizes Film Transfer Imaging Technology (FTI). The key component of FTI technology is the closed, self contained material cartridge that consumes less material than other 3D printers. The VFlash, a plug and play peripheral device, can produce parts up to 9x6.75x8+for fit and form checks, proof of concept and some testing. Priced under \$10,000, it's poised to become the most affordable 3D printer but still does not offer the material choices and accuracies of the large frame SLA & SLS machines.

These are great attributes for an affordable desktop printer but as you can see there are areas where they fall short and service bureaus possess the tools to address those issues. With machines that can build parts up to 60+and can hold tolerances as tight as +/- .002+, service bureaus have the ability to deliver the most accurate parts of any size with the finest detail and surface finish. This capability, coupled with the plethora of material choices, the custom finishes available and the same day and next day delivery options keeps customers coming back to service bureaus for their parts.

Desktop printers have their place in the product development process but will never replace the need for large parts or large part quantities that require production or close-to production materials, finishes and accuracies. The real industry impact from these printers is a refined or mature method of using additive fabrication to develop more custom products that have a shorter life. 3D printers have their own niche as do service bureaus and I am pleased to see 3D printers available at these prices. In fact, we are giving away a 3D Systems VFlash Desktop Printer at the RAPID 2008 show as a thank you to our customers for doing business with APP.

So, am I afraid of losing business to 3D printers? Absolutely not. 3D printers allow customers to produce quick prototypes at their desk for early design approval. Service bureaus may miss out on some of this initial prototyping but ultimately service bureaus are here to aide those customers that require models of a higher quality whether it's a superior surface finish, a high end show model, a functional model in a production grade material for testing and ultimately production.