Crafting Needs Drafting … Thoughts on 3D Printing

3D printers promise to revolutionize the production of prototype and low volume parts. With improving resolution and declining costs, these machines are rapidly becoming attractive to the serious hobbyist. Even for those hobbyists hesitating about buying a machine, more and more 3D printing service shops are sprouting up that offer 3D printed parts at reasonable cost.

But there is one serious challenge which gets relatively little attention in the media. The challenge is that each machine needs a computer generated input file that accurately describes the part to be made. For simple parts, those files may not be too difficult to generate. But for complex parts, the files need to be generated using CAD software and, even then, great care has to be taken to ensure the files have the right attributes and internal consistency. So even though 3D printers promise to 'democratize' the production of parts, the need for CAD-based files throws up a significant barrier in front of the hobbyist. Eventually, these machines may accept simpler, less demanding file requirements but, for now, the input file challenge is unavoidable. Sketches or rough drawings won't suffice. We're entering a world where crafting will need drafting.

This seismic shift to 'draft, then craft', poses a dilemma for the serious scratch-builder. Do you persist with traditional kit and scratch-building methods or make the time and money investment to learn CAD? There are some simple and/or free programs available (e.g. Google Sketchup) but they are fairly limited as to what shapes you can design. CAD software capable of handling non-uniform curved surfaces for, say, automotive modeling, is expensive and, on top of that, you need a computer powerful enough to handle the demanding graphics requirements. It's a non-trivial investment in both time and money so that makes it a tough choice.

But, so far, my own experience has been very positive. Beyond access to 3D printed parts, CAD software also encourages dimensional consistency. No more cutting and fitting on the model. No more pulling apart of assemblies because something needs to be added behind. All the dimensions and layers of parts can be worked out on the computer. In essence it reinforces the discipline of 'measure twice and cut once'.

Traditionally, serious scratch building is all about craftsmanship. Creating unique parts out of an assortment of materials with a variety of tools. Often the shape of a part is complex and requires a practiced eye to get the shape and proportions right. If (as is often the case) accurate dimensional information is not available, the serious hobbyist will work with approximations and custom fit the parts. It's time-consuming, painstaking, creative work. But if those complex parts (or subsets of those parts) can be made by a machine, the opportunity to simplify scratch-building is enormous. It redefines the nature of the task. The value-added, and the required skills, shift toward drafting. Figuring out the size of a part and making sure that its size is compatible with and consistent with all the other parts is a job that will be done on the drawing board of a computer, not on the workbench.

This, of course, is how most products are made in the world of production. There allowances have to be made for different materials and their strengths and the limitations of the machines that produce the parts. This is be equally true for the modeler and the use of 3D machines. It's simply not possible to just scale down the prototype part. So drawing up a scaled down version of, say, a vintage car, requires some serious reverse-engineering skills. The parts have to be both dimensionally consistent with each other and of such a size that they have the required strength to do their job on the model. In the world of 3D printing all this work will be done up front on the computer. It's work that requires intellectual craftsmanship rather than physical craftsmanship, but it is no less demanding.

Welcome to the new world in which Crafting Needs Drafting.

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