Evolving the Design Process, 3D Printing, and Fast Iterations

Felipe Castaneda
Makerbot - Design and Marketing Manager

Learning Objectives:

- Understand basic components of the iteration process.
- Understand the benefits of in-house 3D printing for expedited iterations
- Compare Industrial grade 3D printing vs Desktop printing and it's place in the development cycle

Description:

3D printing adds an incredibly powerful tool to the design process. As the industry moves beyond 3D-printed Yoda heads and Pokémon, we unlock even more-dramatic efficiencies and advantages for developers. In this talk, we'll look at how pairing parametric modeling with 3D printing enables users to iterate faster than ever before and build fully functional prototypes. Lastly, we'll explore how 3D printing's "slicer" software is quietly one of the biggest drivers of the technology.

Your AU Expert:

As an Industrial Designer at MakerBot I am tasked with designing MakerBot products, and 3D models that will test the capabilities of our products and materials. Before coming to MakerBot I worked at an architecture firm and then a design consultancy developing everything from consumer products to urban spaces. I have broad experience with parametric modeling in Grasshopper and Autodesk Fusion 360. I have been using rapid prototyping for several years, both at my former job and of course at MakerBot. I am an expert in the quick iterative desktop 3D printing design process. In addition to product design, I sit with the MakerBot marketing team where I am tasked with translating product design into branding. Our primary customer is the industrial designer, and with my experience I try to provide an insider's perspective to both teams as we develop the next generation of 3D printers.

3D PRINTING

As the the 3D printing industry has matured we have gained better understanding of the very specific applications and benefits of a wide range 3D printing capabilities. Starting with hobbyist printers and running all the way to industrial grade 3D printers it is important to understand the place and application for different systems.

Overall 3D Printing also known as additive manufacturing can be applied as either a manufacturing process or a development tool. Using 3D printing as a manufacturing process can help create extremely intricate geometries that could not be created in any other way. However, the process is still time consuming and because of that mainly focused on short or single prints of extremely specialized products (e.g. medical applications, aerospace industry and formula 1 cars). On the other hand, when 3D printing is used as part of the product development process the potential applications tend to grow.

Not constrained by specific materials or finishes, 3D printing for product development can positively affect the whole development process. From early draft prints that can help understand general project boundaries and ergonomic studies to detailed prints that can simulate different durometers, components and assemblies required for the project at hand 3D printing becomes a default tool for most engineers and designers.

Industrial VS Desktop 3D Printing

Understanding how far along in the development process of your project you are is key to know what type of 3D printer might benefit you the most. Here we will discuss the implications of Industrial vs Desktop 3D printers. We now know that Desktop 3D printers can greatly benefit the early stages of the development process, where speed and agility are paramount. Naturally Industrial 3D printing will always offer a wider range of materials and finishes, but the extended menu often comes at a hefty price and time cost.

Product Development Process

Most projects will often begin with a wide number of variables and potential solutions for the question asked. At this stage it is key to enable your team to be able to explore as wide and as fast as possible in order to cover as many alternative solutions to the problem at hand. All of the work invested at this stage will enable you to better understand the problem at hand and at the same time make inexpensive mistakes that will prevent extremely expensive mistakes to happen in further development stages.

As you progress in your product development process you will gradually require more and more resolution to the concepts that you will generate moving from draft low resolution alternatives into high resolution functional prototypes during the final stages of your project. Early development stages will require broader concept iterations that may be split into different families of solutions addressing the challenge at hand in widely different ways. During this stages quick draft printing that simply represent form factors, volumetric studies or general ergonomic studies will benefit your process the most.

After a general idea for the solution has been achieved and more resolution is needed in order to address specific questions, incremental iteration prints will be required. Still prioritising quick iterations over high resolution printing most users will focus on printing individual details or components of the product. Exploring isolated surfaces in order to better understand the product geometry, testing component arrangement and internal distribution for electronics, or even focusing on access points for different manufacturing process to be applied may be a focus for this stages.

Once the project has reached enough clarity and definition your team will really need to move into a higher grade of printing system in order to better simulate the different nuances of your product. Although durometers and colors can be simulated by several entry level printers, when trying to simulate the more specific nuances of a functional prototype, higher end polyjet prototyping will be better suited for your needs. This will often imply compromising in having higher printing costs and likely extended lead times for your prints. This however should correlate nicely with a lower need for iterations. Meaning you will likely sacrifice print time but at the same time you will require a much lower number of iterations for this final stage.