

Billy Vail  
OM 380-001  
Professor Foster

## **Prototyping-A Mini-Tutorial**

### **Introduction and Prototyping Defined**

Although most of us don't remember the year 1947 when Chuck Yeager broke the sound barrier in the Bell X-1 aircraft, it was a historical event for prototyping. Why? Because the first prototype for this aircraft was a bullet. Yes, a bullet that is placed in a gun! During the development of the historic aircraft, designers at Bell examined a 50-caliber bullet flying at supersonic speed. The bullet was aerodynamically stable even as it broke the sound barrier. The Bell X-1 aircraft was designed in the shape of the 50-caliber bullet. Adding wings and a powerful rocket engine made the Bell X-1 aircraft. That's why the news stories referred to this historical event as "a bullet with wings."

The actual definition of a prototype is "an original model after which other similar things are patterned," according to Webster's II Dictionary. A more innovative definition, according to Tom Kelley "Prototyping is problem solving. It is a culture and a language. You can prototype just about anything-a new product or service, or a special promotion. What counts is moving the ball forward, achieving some part of your goal." There are several types of prototyping such as paper, Computer Aided Design (CAD), rapid, and basic prototyping. Each of these methods of prototyping are used in different industries. Each of these types of prototyping and their usage are explained in the section below, How to Use Prototyping.

This mini-tutorial on prototyping will show how to use prototyping, where prototyping is used, and finally where to get more information about prototyping.

## **How to Use Prototyping**

A paper prototype is perhaps the cheapest of the prototype options available. This option creates a series of drawings of the design that the developer has produced. These drawings are shown to the decision-makers, which either approve or reject the designs. This allows the decision-makers to give feedback to the developer, which can improve the design or product. This method of prototyping allows the company to visualize the design in the early stage of the product, without investing a lot of resources and money into the project, to determine if the product is worth pursuing,.

Computer Aided Design (CAD) allows the developers to draft their designs of the product on a computer. This option has improved the ability of the designers while making the whole process much simpler. It can be used to design anything. This method of prototyping allows many different people throughout the world to work on the design through the use of CAM, a multi-user version of CAD. For Boeing, a person in Japan and Europe can help design an aircraft being developed in the United States. This method has great benefits for global firms.

Rapid prototyping is used to accelerate the overall design process. A rapid prototyping machine makes a solid model from the bytes of the design information stored in a computer. This is used to test designer's ideas before the product hit the shelves of the stores. Rapid prototyping often leads to a high-quality, defect free product. Software companies often use this method of prototyping because it allows the users to try out the software and give feedback to the companies so that improvements can be made quickly. The product cycle time for computer related software is barely six months, therefore making this method of prototyping valuable to the computer industry.

Basic prototyping is a nonfunctional creation of the design that can be analyzed by the target customer to receive valuable feedback. The most popular basic prototype is concept cars that the automobile industry use to receive feedback on the design of the automobile. This is valuable because mechanics of any car are basically the same; the difference is the design of the car. This is what the automobile industries are interested in and by using basic prototypes, they are able to receive feedback from the customers.

### **Example Where Prototyping is Used**

One example of where prototyping is commonly used is Starbucks Coffee Co. The chain has a busy construction schedule that includes 500 new stores and 350 remodels annually. To help out with the process, Starbucks uses fixture prototyping. This company does prototypes on an ongoing basis all year round. In order to streamline the process, they form prototype teams within Starbucks. The Starbucks team takes into account the specific program requirements, including the function of the unit and the intended location. Once all the requirements have been established, the project is taken to a vendor. Once the vendor approves the paper drawings, the Starbucks prototype team meets with the company to work out a rough cost estimate and time line. To insure that everything that's been proposed will meet the clients needs, the team continuously communicates the proposal changes to the client. When the project is given the green light by the client, the Starbucks prototype team has weekly conference calls with the vendor. This keeps everyone on track. The vendor is given the paper drawings, designs and equipment specifications to help design and develop the prototype. The completed prototype is set up at the vendor's location. Once the prototype is set up, the Starbucks team carefully reviews the unit, insuring all the requirements are met. After this review

has been completed, a meeting is set up for all the vendors who will be manufacturing the unit to analyze the prototype. This process finalizes the prototype and is used for the remodeling job or construction of the new Starbucks store.

### **Where to Get More Information About Prototyping**

There are numerous websites, articles, and books containing more information about prototyping. The following is a short list of sources that I found useful.

<http://www.freequality.org>

<http://www-rpl.stanford.edu/>

<http://rpmimarc.gatech.edu>

<http://www.cubital.com>

<http://www.spline.nl/>

<http://www.helisis.com>

Kelley, Tom. "Prototyping is the Shorthand of Innovation." Design Management Journal Summer 2001: 35-42.

Anonymous. "Prototypical Solutions." Chain Store Age Jul 2001: 96-98.

Jones, Charmaine. "Perfecting the Prototype." Appliance Manufacturer Aug 2001: 49-50.

Jones, Charmaine. "Paid prototyping=Rapid Time to Market." Appliance Manufacturer Oct 2001: 40-45.

Anonymous. "Replacement Part Prototyping Takes Flight." Research & Development Oct 2001: 13.

Foster, S. Thomas. Managing Quality:An Integrative Approach. Upper Saddle River: Prentice Hall, 2001.