

## Applications of 3D printing in product prototype

*3D printing technology makes functional, beautiful product prototypes accessible to everyone. Learn how to get started now.*

If you've ever tried to pitch a great idea for a new product or invention, you know your impassioned description just isn't enough. A detailed sketch or video is better, but nothing wins people over like a prototype they can hold in their hands.

Today, 3D printing is the number one way product prototypes and models are made, and for good reason. It's faster, cheaper, more accurate, and has a better presentation value than carving foam, forming clay, or any of the manual processes once used to whip up very hand-made-looking concept models.



Product prototypes 3D printed on Stratasys professional 3D printers

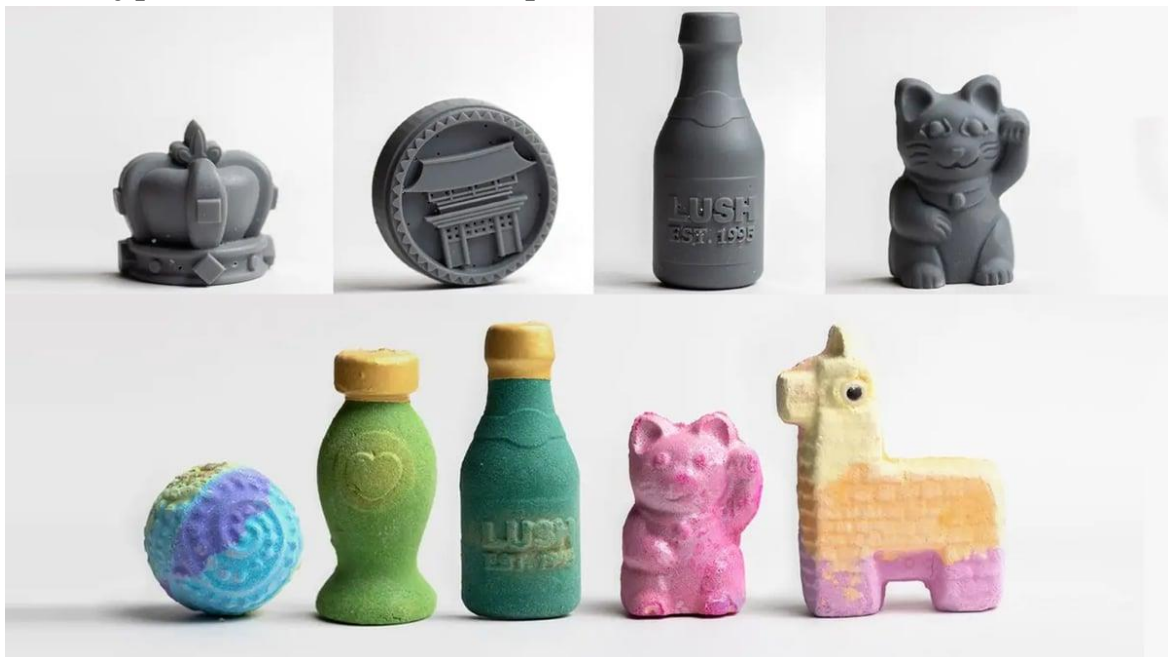
A good prototype gives your product more appeal that's sure to impress your client, boss, or investors. Plus, because 3D printing is so easy and affordable, there's no excuse anymore for using tape and glue.

3D printing, whether you do it yourself or use an online service, enables you to bring your idea to market faster. Depending on your product, you can print a working prototype in a matter of hours, enabling you to test for

functionality and aesthetic appeal, redesign, and print new iterations the same day.

In this guide, you'll learn all you need to know to 3D print your product prototypes, including which materials to select, whether it makes sense to buy your own 3D printer (and which one), and how to select and use on-demand 3D printing services to get your prototype printed fast and delivered to your door.

### Prototypes for Product Development



Lush Cosmetics prototpyes new product designs with 3D printing on Formlabs 3D printers (Source: Formlabs)

Long before you get to the point of presenting your idea, you test whether or not it will actually function. In theory, your product is going to change the world. First, putting it to the test will reveal where it needs more work.

3D printing enables you to create great-looking models but also fully functional, working prototypes strong enough to test in the field under real-world conditions. Practical testing is the essential step in revealing problems you may face in manufacturing your product and in how customers will use your product. Real-life testing and analysis help you bring better products to market.

Many product designers 3D print initial design prototypes in basic plastic, then move up to engineering-grade materials or even 3D printed metal for functional testing.

some examples.



3D printers, like the Zortrax Inventure, can 3D print movable mechanisms as one part accelerating functional testing

### **Full-Size & Functional**

Black Diamond Equipment makes innovative climbing, skiing, and mountain gear known for comfort, durability, and performance. All of their products go through a rigorous design, testing, and iteration process before they come to market.

The company has used 3D printing in its design workflow for years to create prototypes or scaled-down models in-house. Larger full-scale prototypes were often outsourced to a prototyping firm because the standard size of desktop 3D printers was too small until they found the Formlabs Form 3L — a stereolithography (SLA) 3D printer with a build volume that can handle human-scale prototyping of products such as helmets and the mountaineering shovel pictured below.



Black Diamond put its trail shovel design to the test as a full-size prototype 3D printed on the Formlabs Form 3

### **Affordable Iterations**

Solo entrepreneur Khalid Bou-Rabee took a different approach to test if his new home weight-lifting workout invention would actually function.

“Computer simulations can be very accurate, but nothing can replace real-world testing. I needed prototypes,” he told All3DP.

At first, the young entrepreneur thought he’d order a stainless steel prototype, but changed his mind quickly when he was quoted at over \$1,000 for a single CNC machined metal part. He then turned to the 3D printing service marketplace Craftcloud which provides instant quotes on any uploaded digital design. Through this platform, Bou-Rabee discovered a strong-as-steel polymer alternative and found a 3D printing partner he could afford to produce multiple iterations, which enabled him to test his product and bring it to market within a year.

Functional testing often means creating a prototype in the same material that the final product will be manufactured in, such as carbon fiber or stainless steel. With the ability to quickly 3D print stainless steel parts both in-house and through on-demand services, design teams can produce functional prototypes for testing, such as the 3D printed aluminum bicycle frame from Canyon pictured below.





Engineers at bike company Canyon 3D printed a bike frame in aluminum through service company Materialise (Source: [BIKE Magazin](#)) In another example of metal 3D printed prototypes, Shukla Medical produces surgical tools using 17-4 PH stainless steel on a Markforged 3D printer. Stainless steel is the same material as many of its final products. These metal tool prototypes go into the hands of surgeons for evaluation. “The surgeon can envision using it in the actual incision and can tell us if it feels the right way in their hands,” says Zack Sweitzer, the company’s product development manager. “Being able to prototype more efficiently and get finished products to market more quickly will keep us at the forefront of the industry.”

### 3D Printing Materials for Prototypes



Clear resin for clear parts from Nexa3D

The materials you can 3D print your prototype in are virtually limitless, spanning soft silicons, metals, tough plastics, conductive copper, sustainable wood, and even chocolate. There are thousands of 3D printing materials available and methods to 3D print with multiple materials at once.

If you're unsure which materials would be best for your prototype, we have dozens of [in-depth guides](#) here on All3DP that explain the various materials, their properties, and what they're most commonly used for. We've linked a few in the list of materials below.

### **Common 3D Printing Materials:**

- [PLA Plastic](#)
- [TPU \(flexible\)](#)
- [Stainless Steel](#)
- [Carbon Fiber](#)
- [Flame Retardant Material](#)
- [Nylon](#)