

## Overview of 3D Printers

From industrial workshops, to engineering laboratories, to classrooms and garages, 3D printers seem to be everywhere these days. As such, a working knowledge of these machines is becoming increasingly important to many careers. If you're looking to begin or grow your program's 3D printer offerings, one of the first things you should consider is the type of output you're looking for. Let's look at the types of printing materials that might be useful in your classroom.

### **Thermoplastics: ABS and PLA**

The most common 3D printers on the market today are undoubtedly those that print plastic filament. This is most often a spool of thermoplastic "wire" that feeds into the print mechanisms, is heated to melting point, and then added to the print in layers. The most common thermoplastics are ABS and PLA.

ABS and PLA are similar in cost but have slightly different properties. ABS is somewhat stronger and heat resistant and more easily machined. However, it is more prone to warping and is not biodegradable (though it is recyclable).

PLA is somewhat easier to print with due to its lower printing temperature. It is better suited for parts with fine details. PLA is biodegradable under certain conditions.

Printers using thermoplastics have been on the market for some time now. They are easier to find and work with than other types and are generally more cost-efficient. You can [learn more about the various models of these printers Learning Labs offers here](#).

### **Nylon and Nylon-Fiber**

Another type of plastic used in 3D printing is nylon. While it does not have the strength or stiffness of ABS or PLA, nylon's malleability makes it more durable. It is also more chemically resistant. Nylon can also be combined with other materials to compensate. These include carbon fiber, fiberglass, and Kevlar. Including any of these materials greatly increases the strength and stiffness of a finished part.

3D printers that use nylon and nylon composite fibers are generally a little more expensive than those that use thermoplastics, as are the materials themselves. But if you need industrial-strength prototypes, these materials are a good option. You can find [more information on these machines here](#).

### **Resins**

Printers using liquid resins have gained a much larger share of the 3D printer market recently.

Many different types of resin can be used in resin printers, each creating different properties in the final model. These include resins used for engineering formulas that increase certain physical properties of the model, such as strength, rigidity, etc. Other resins are used in jewelry, ceramics, and dentistry.

Unless the model is specifically designed otherwise, most will be solid on the inside. This increases material use and weight to a small degree. The storage and disposal of liquid resin and the washing

liquid also creates a bit more work than plastic printers. This is offset, however, by the much higher level of detail possible with resin printers and the many types of resin currently available. You can [find out more about resin printers and their applications here](#).

## **Metal**

It might come as a surprise, but 3D printing with real metal is also available outside an industrial setting. This process involves printing the part (most often steel) and then heating it in furnace to remove impurities, such as the binder used in printing. The part is then cleaned in a wash station.

These machines are much more expensive and require a good deal of supporting structure, such as ventilation and chemical control and storage for the furnace's fuel and the wash station's liquids. That said, nothing compares to having a fully metal part to test your prototypes. [Click here for more information](#) on the metal printers available through Learning Labs.

If you're looking to incorporate 3D printers of any sort into your classroom, Learning Labs can help. We [offer a variety of printers](#) that work with the materials discussed above. Please [contact your regional manager](#) or [visit our website](#) for more information.