

Introduction to 3D printing.

What do you do when the part you need is not available anywhere?

Find something close and make it work?

Been there, done that with mixed results.

Organize others with the same needs and get new parts manufactured?

Still can be cost prohibitive.

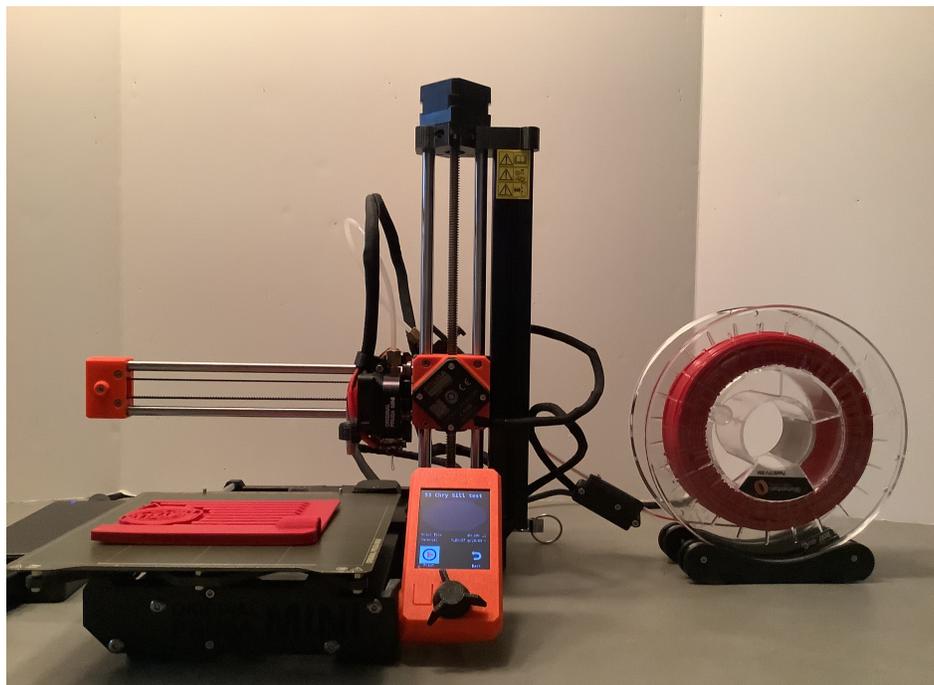
Do without?

Might not be an option if you want to keep your car on the road.

New technology promises to fill some gaps for addressing the unobtainable. 3D printing is an option to consider. I've noted that a recent old car publication noted use of a 3D printer in the restoration and wanted to share my experiences with this new technology.

Depending on the characteristics needed in the final product, 3D printing can provide final components or patterns for molding or casting. If you can use Photoshop or similar tools to create a photo collage, you can probably learn to create 3D prints.

While I've been a software engineer for the last 30 years, I began my career as a designer draftsman. Over the last year I've returned to my technical roots and purchased a smaller 3D printer capable of printing something up to 7"x7"x7" for \$350 as a learning tool. I had the advantage of knowing a mechanical engineer who was well versed in the technology who suggested a particular vendor as a good starting point.



I was pushed in this direction by my 1953 Chrysler convertible whose hard rubber sill plates are falling apart. Considering that NOS and NORS parts would also be old with limited life remaining and with a cost of \$1200 for NORS parts, I chose instead to learn this new technology. I've reserved \$1200 for the purchase of a large format printer with the goal of making the sill plates myself. While 3D printed parts may not be 100% identical to the original parts, they can be very close. In the case of my sill plates they could even be enhanced by adding a Chrysler logo versus the plain originals.

When selecting a 3D printer you need to consider what you plan to create, what it is made from and

what you can justify spending as well as ensuring you have an appropriate place to setup and run your printer. While a small printer with limited capabilities can be in the range of \$200, commercial printers can run into thousands of dollars. Amazon currently has printers ranging from \$160 to \$23,499.

There are several types of 3D printing technology. The type that is most popular today with hobbyists and what I've purchased use Fused Deposition Modeling (FDM). This type of printer uses a roll of filament which is heated and extruded, depositing sequential layers to construct the object. These types of printers can print a wide range of materials dependent on the printer specifications. Common materials for filament printers include:

PLA - most commonly used. Good dimensional stability - brittle

ABS - tough, hard with minimal flex, used in Lego blocks

TPU - comes in a range of harnesses - from hard rubber to soft grommets

PET - food safe used in containers etc.

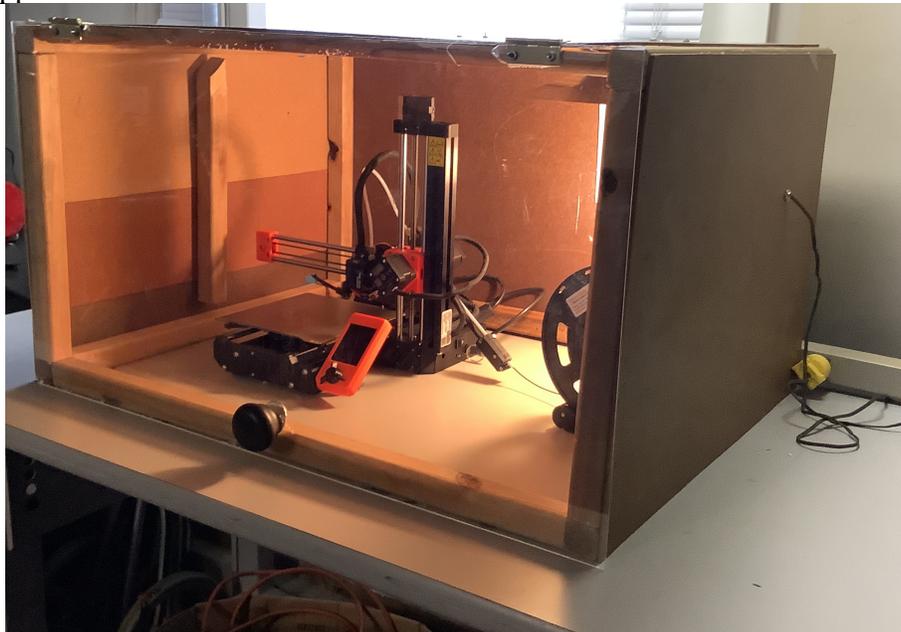
See this link for more details: [Ultimate 3D Printing Materials Guide | Simplify3D](http://www.simplify3d.com)  
(www.simplify3d.com)

There are PLA and ABS filaments available with exotic fillers like metals, wood and carbon fiber in a wide range of colors.

I've personally used more PLA than any other plastic, but recent work has been primarily ABS. I anticipate using TPU for my sill plate project.

Most 3D printers need to be setup in a controlled environment. The plastics are sensitive to temperature and humidity and the printer needs to be on a stable surface as vibration can cause problems with the quality and accuracy of prints. I found that I could not reliably print in my garage after the temperature dropped below 35F and moved it to my finished basement for the winter. It also had some issues in that location during the summer when the temperature and humidity were high.

Some printers come with an enclosure. Depending on the environment where you want to put your printer or the type of plastic you plan to use (i.e. ABS), you may want to create an enclosure if the printer did not come with one. Since I keep mine in the garage as much as possible, I built an enclosure that has a 100 watt incandescent light bulb in it that allowed me to keep it in the garage as the temperature dropped.



To create a 3D design to print you need a few tools on your home computer. What I'm using is a

windows based PC with the following programs:

- Slicer – this is typically provided or identified by the printer manufacturer. What I'm using is based on open source Slic3r program. The slicer is responsible for taking the 3D model and breaking it down to the layers the printer will generate. [Slic3r - Open source 3D printing toolbox](https://slic3r.org) (https://slic3r.org)
- Autodesk Fusion 360 – Computer Aided Design (CAD) tool for generating 3D models. This professional tool is available for free if you are not making more than \$1000 annually from what you create. : [Fusion 360 for Personal Use | Fusion 360 | Autodesk](https://autodesk.com) (https://autodesk.com)
- Inkscape : open source tool for drawing that generates vector images needed by Fusion 360. [Draw Freely | Inkscape](https://inkscape.org) (https://inkscape.org)
- Adobe Photoshop: The copy I have is quite old and does not have the new features which include 3D modeling so this could be the only tool you need – but it does come at a cost of \$21/month or more. [Creative Cloud pricing and membership plans | Adobe Creative Cloud](https://adobe.com) (https://adobe.com)

Next – Basics of 3D modeling and Internet resources