3D Modeling Negatives

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https://learn.adafruit.com/3d-modeling-negatives

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Overview

3D printing has captured the attention of a world-wide audience. Makers of all ages are producing everything from custom skateboards (https://adafru.it/cQc) to flutes (https://adafru.it/cQd). It's truly amazing...

But what comes off the build platform is generally not as strong as cast or injection molded parts. (There are some exceptions like the rocket engine printed by NASA (https://adafru.it/cQe) but that's not what we're talking about here.)

For mere mortals on a budget... it's about practicality and augmenting your prints with strong, plentiful, and inexpensive parts whenever possible.

Need to make a robot rock and roll? A 3D printed ball bearing won't be round enough, so let's use one of these steel ball-bearing casters:

This little guy can do the job nicely... but how do I incorporate it into a design?

Grab your calipers and let's get to it.

De-construction

Or as I like to call it, "Spontaneous Geometric De-construction."

That's geek talk for identifying the base shapes that your subject is comprised of and reproducing them virtually.

Keep in mind that the object that you are working on will be used to subtract material

from a solid object... creating a cavity in which the real part will be placed.

Measure each dimension carefully.

Tinkercad is a great tool for the 'virtual re-construction' or modelling phase. Combine appropriate geometric objects along with your measurements in order to produce a digital / virtual positive.

If you need a little more detail here, give Tinkercad Quests (https://adafru.it/cQf) a try.
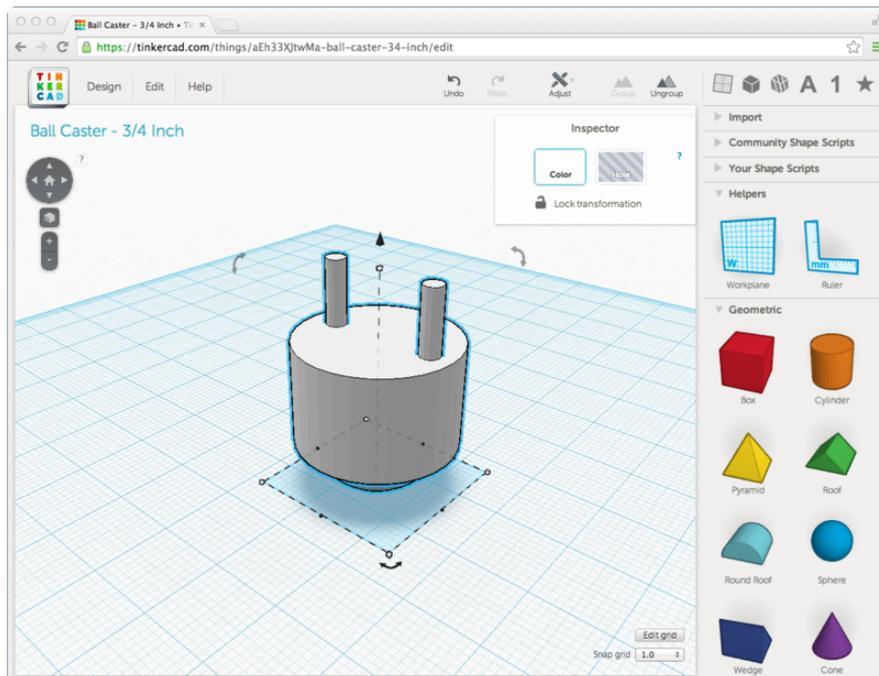
Tolerances might bite you... depending on the type or method of 3D printing you intend to use. You may need to add ~.2mm on most dimensions in order for your part to fit properly.

If Tinkercad doesn't wet your whistle there are other options...

- 3DCrafter (https://adafru.it/cQg)
- Autodesk 123D (https://adafru.it/cQh)
- Blender (https://adafru.it/aVR)
- netfabb (https://adafru.it/cQi)
- OpenSCAD (https://adafru.it/aVT)

Including using the new shiny MakerBot Digitizer. Which, might be overkill for this object... but it's something you should keep in mind.

From Positive to Negative

I often print the model I'm working with and double-check its dimensions against the original. Measure twice.. cut.. er.
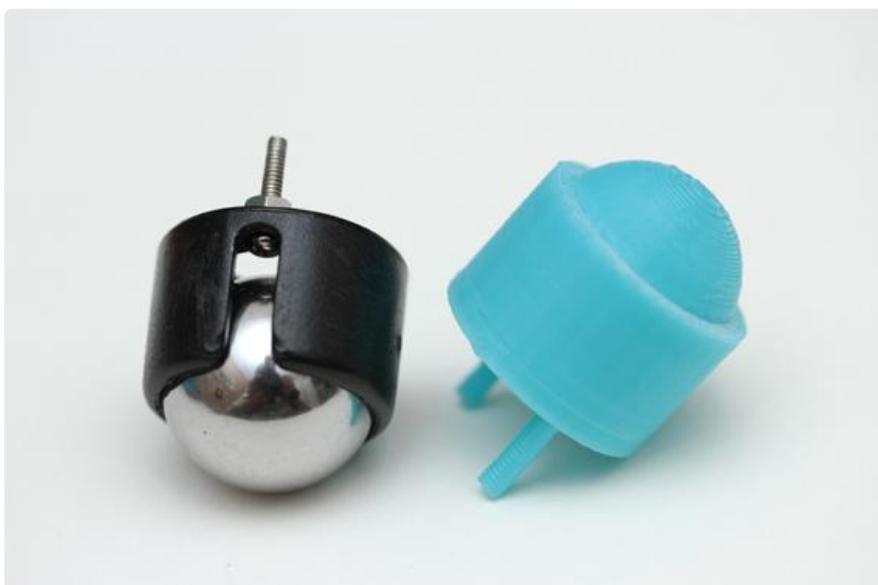
Okay, maybe that saying doesn't totally translate with 3D printing - but you get the idea.
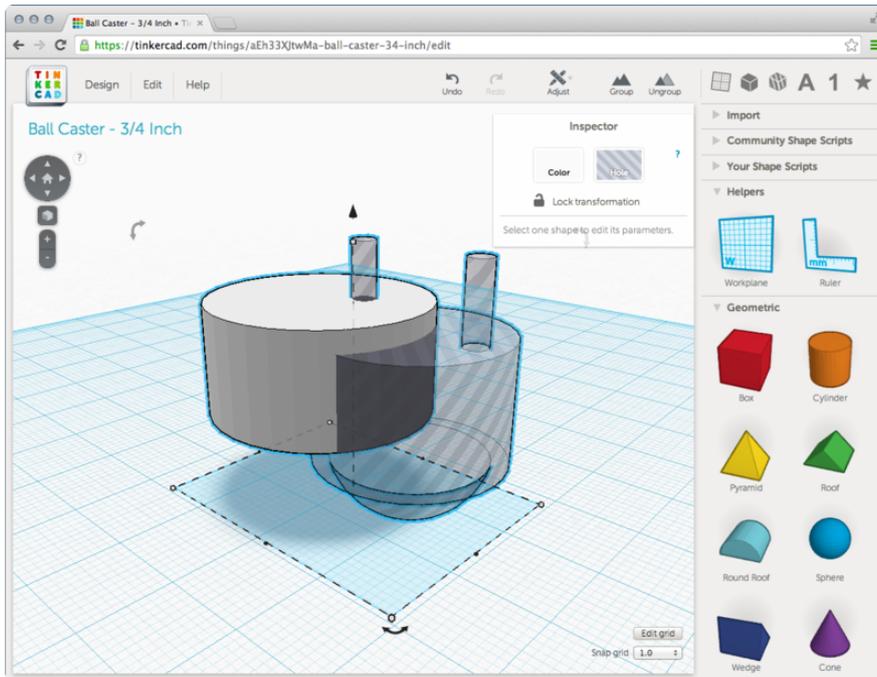

Mix it... re-make it!

When you're satisfied, bop on back to your CAD software and turn the model of your object into a negative.
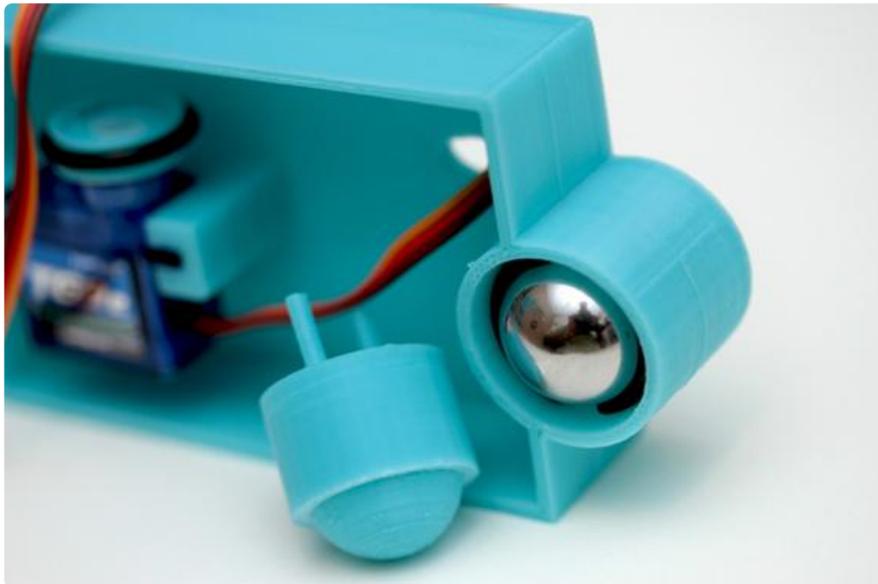

Then, combine it with a solid object and voi la!

When printed, you should have a cavity in which the original part fits like a glove.

Let it Roll

On cold hard steel.

Seriously, not everything can be 3D printed yet - with an emphasis on yet.

Until then...

Make the things you love.
Love the things you make.
Make the things durable.

So others can love them too.