



Magnetic shoelaces

Created by Ruiz Brothers



<https://learn.adafruit.com/magnetic-shoelaces>

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Overview



In this project we'll show you how to 3d print your own magnetic shoe lace closures. This can be really useful for anyone with dexterity problems, or if you just want to make tying your shoes a whole lot easier.

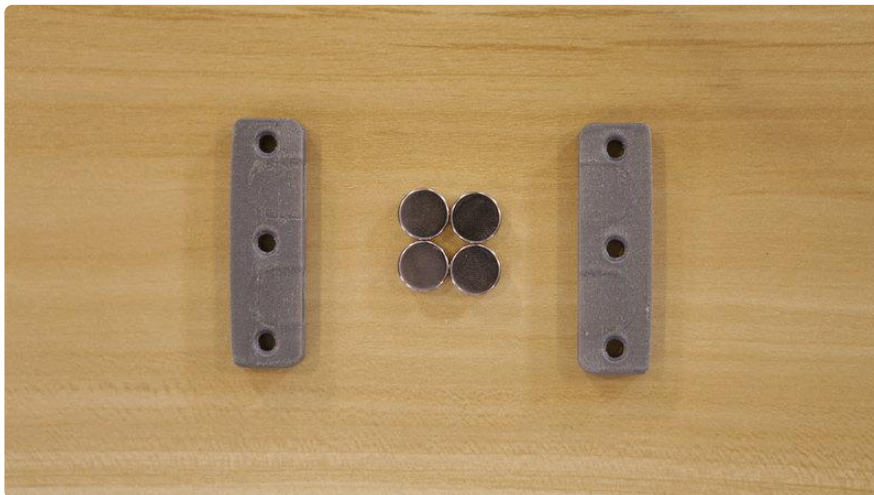


Strong neodymium magnets help keep your laces together while running, walking or even working out. And after a long day on your feet, the magnets are easy to detach.



The parts are 3D Printed and the design is easy to comstimze to fit your shoe size.

The magnets press fit inside the parts and don't require any adhesives.



Parts, Tools and Supplies

You'll need the following tools, parts and supplies to complete this build.

- [3D Printer \(https://adafru.it/diH\)](https://adafru.it/diH)
- [3D Printer Filaments \(https://adafru.it/tbg\)](https://adafru.it/tbg)
- [High-strength 'rare earth' magnet \(http://adafru.it/9\)](http://adafru.it/9)
- [Digital Calipers \(http://adafru.it/294\)](http://adafru.it/294)



3D Printing

Download and 3D Print

The 3D printed parts can be downloaded with the link below.

Edit Design Source

<https://adafru.it/tbh>

Edit Design (with User Parameters)

<https://adafru.it/tbA>

Download from Thingiverse

<https://adafru.it/tbi>

Download from Youmagine

<https://adafru.it/tbj>

Download from Pinshape

<https://adafru.it/tbF>

Slice Settings

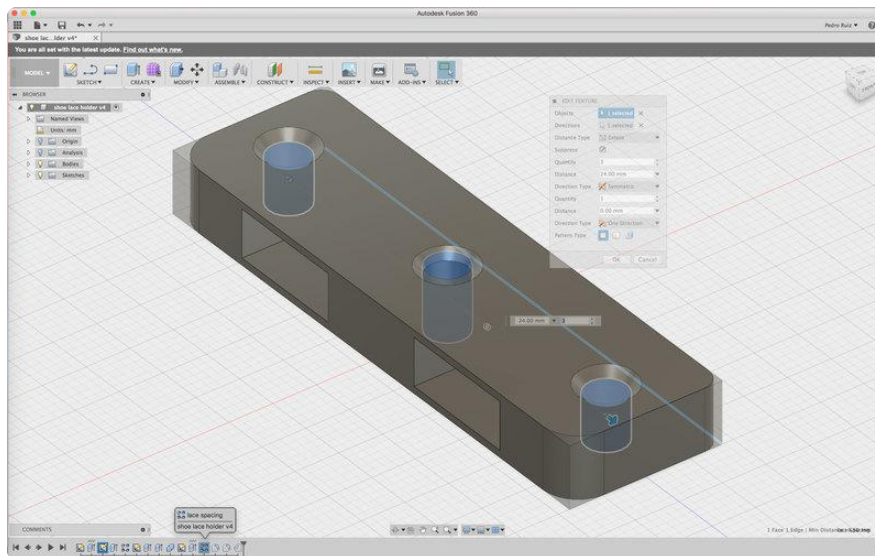
Depending on your 3D printer, you may need to adjust the slice settings. We tested the closure on a Sigma BCN3D, Deltaprinter Go and a Printrobot Play. They do not require any support material and are oriented to print "as is".

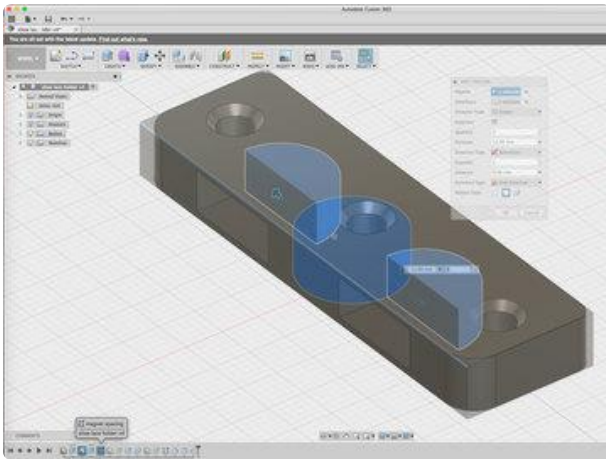
- Nozzle: 0.4mm
- Extrusion Multiplier: 1.0
- Extrusion Width: 0.48mm
- Layer Height: 0.2mm
- Nozzle Temperature: 220c

Customize Shoelace closures

Our shoelace closures are designed in Fusion360. Modify the design by adjusting the magnet size, lace hole spacing and the entire size of the closure. Each action is labeled in the timeline.

You can also download different formats to use in your preferred modeling program.

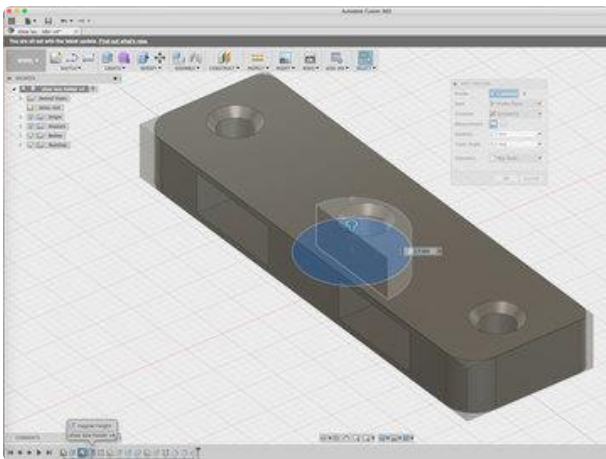




Adjusting magnet tolerances

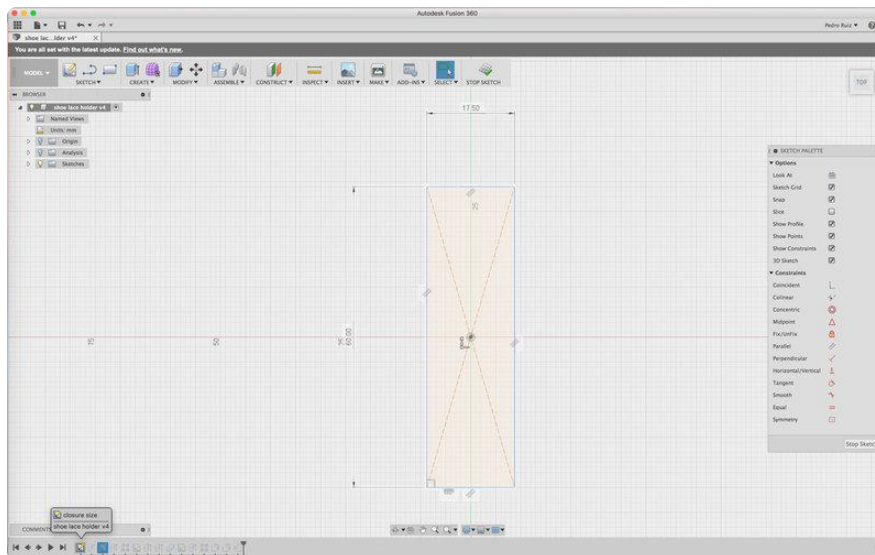
Magnets can have small variations in size and thickness, so we'll need to make sure the tolerances are pretty tight.

Carefully measure each magnet and then update the height of the closure cavity.



Adjusting Spacing

The pattern feature controls how far apart the lace holes and magnets are from each other. Measure and adjust the values based on your shoes tongue size and laces holes spacing.



Adjusting shoelace closures size

The default length of the closures should work on most shoes but you could always update the design files to completely customize the size and look of the closures.

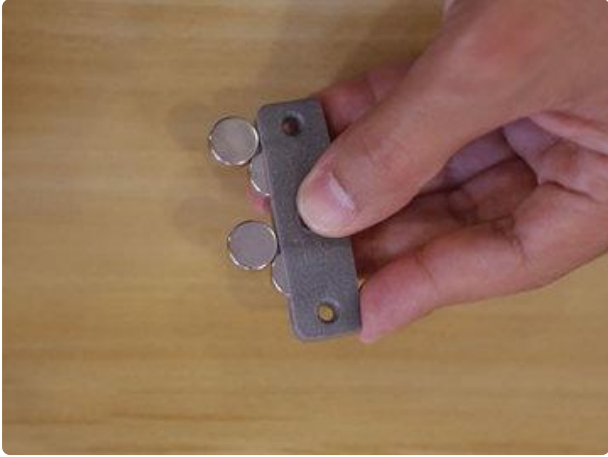
Assemble



Fit magnets inside shoelace closures

Press fit the magnets into each side of the printed closures. Make sure the tolerances are tight so the magnets can't pull each other out of the closures.

These magnets can have small variations in size and thickness, so we'll need to make sure the tolerances are pretty tight. You could also use glues to hold the magnets in place.

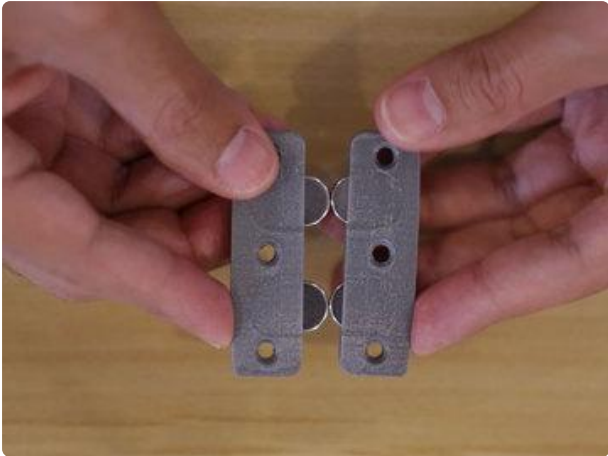


Align magnets

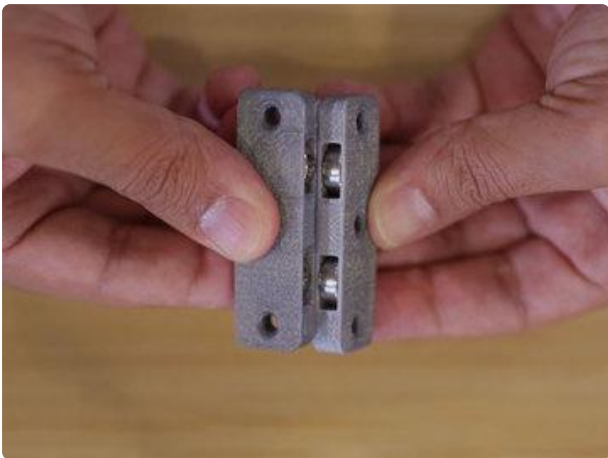
We want to make sure the magnets are all facing each other so they don't repel.

Check tolerances

Test the strength of the fittings by pulling the closures apart. We want to make sure the magnets can't pull each other out of the cavities.



Adjust the design or use glue if the magnets can pull each other out of the closures.





Prep shoes

Untie your shoes but leave laces on the last row of holes like shown in picture.



Loop laces

Thread laces through each lace hole and then loop the laces into each closure from the bottom of the shoe to the top. Leave a bit of slack so the laces aren't too tight. Test by putting your shoes on to ensure the magnets can still reach each other.



Hide excess laces

Once you lace the closures to the top of the shoe we can either shorten the laces or hide the remaining laces by looping it back into the shoe.





Now you can adjust any twisted parts of the laces and try them on!

We tested the magnet holder extensively through a couple of the Disney parks and never encountered any problems with them detaching. They easily snap together when you put them on and easily come off after a long day of walking around.



And that's pretty much it! We think this is a great project idea for anyone who's looking to get into designing for 3D printing. There's a lot to learn when designing to solve problem. Even if it's a simple project, it proves really useful because it's something you can use everyday.