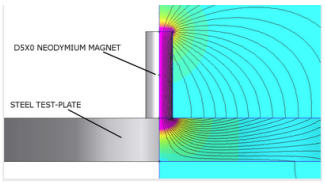
Conclusion and Questions



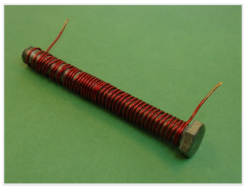
Is an electromagnet stronger than a neodymium magnet? It depends. There are many choices to make when designing an electromagnet, and each influences its strength. Size, number of turns of wire, wire gauge, current, core material, etc. – all of these things influence the strength. There's no simple answer.

What size electromagnet should I use to be equal to a specific neodymium magnet size? It depends. As with the last question, it depends on the details of the electromagnet's design.

Can an electromagnet repel a neodymium magnet? Yes. If the current is going in the proper direction so that like poles of the two magnets are facing each other, you'll see repulsion forces. You might find situations where a neodymium magnet is more attracted to the steel core than the repelling force, especially when they get close.

Do I need to use a coil of wire to re-magnetize old ceramic or Alnico Magnets? No. While you can find old instructions for re-magnetizing old magnets with a recharging device based on a coil of wire (like this electromagnet), you might not need this equipment today. Since neodymium magnets are so much stronger, you might be able to remagnetize your old magnets with some neo magnets. See Why are Magnets Shaped like Horseshoes for an example.

Won't an electromagnet perform better with a neodymium magnet as the core? No, not necessarily. While neodymium magnets are great at being a magnet, they don't have a high relative permeability like steel or iron. That's the property that tends to redirect the electromagnet's field through the core. A neodymium magnet in there, even an un-magnetized one, might only be a little better than an air core.



Why did we use so much wire? Can't I use less? Many pictures we've seen use a LOT less wire. Usually, this works out to be a lot less powerful, because strength goes up with the number of windings. It also tends to run out the battery more, since you're drawing so much current – essentially shorting the battery out with such a short piece of wire.

Also note that, even with our longer length of wire, we're drawing way more current than a typical battery is meant to provide. It's great for a demonstration, but you'll go through batteries very quickly if you actually tried doing useful work like this.

AA batteries have performance charts that only go up to 0.5 A, while C and D batters go up to 1 A. Even at those levels, it says you'll use up the battery really fast. In our examples, we're drawing 3 or 4 Amps, which is really too much for the little battery.

Be creative with Magnet Wire. Let us know what projects you're working on with it!