Application No. 356: Mendocino motor

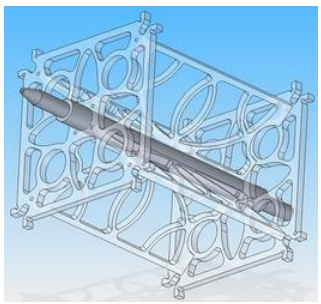
Author: Klingon77, Germany

Solar motor with levitating rotor

Little by little I built a Mendocino motor. What makes it special is its (almost) levitating rotor, which is powered by small solar panels.

The rotor only touches a hard plate axially on one side and levitates otherwise, being carried by permanent magnets.

Manufacturing process for Mendocino motor



This is the base body of the rotor, which is made of 2 mm thick transparent polycarbonate.

My 3D CAD made it possible for me to design the pieces shapely and stable. My little CNC milling machine facilitated a speedy fabrication.

The first piece of the rotor is done. Later, the coil wire will be wound into the notches in the corners.

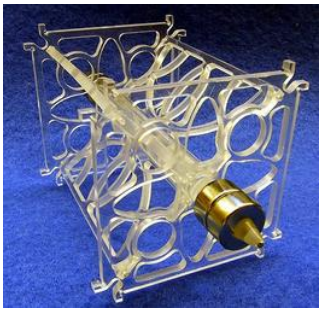
The solar panel is mono-crystalline and has a maximum current of approx. 200 mA at a voltage of approx. 0,5 V.

This translates into a maximum power of approx. 0,1 Watt.

The match shows the small dimensions of the motor.

I milled the pieces a certain way so I could insert the solar panel with little pressure and create a clamp-connection.

Later, the pieces will be glued together for a permanent hold.

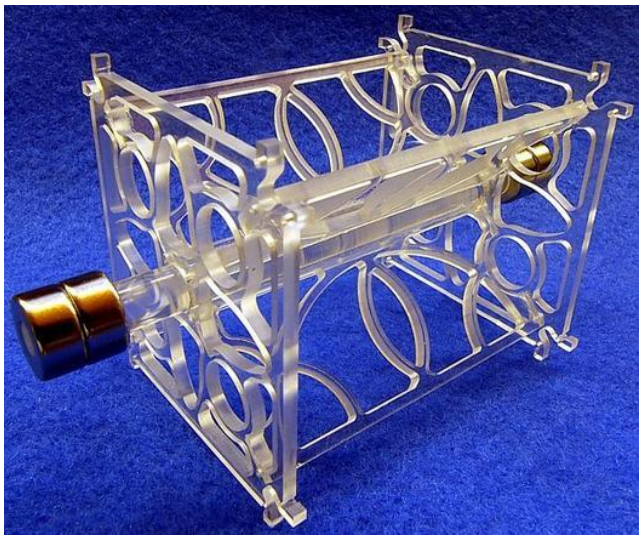


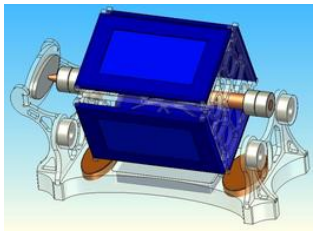
Here you can see the completely glued rotor. The axle is made of Plexiglas, because I couldn't find round polycarbonate rods.

I glued a steel sphere (1,2 mm diameter) into the peak (right).

It is hardened and provides a long life expectancy with little wear and tear.

I put two R-10-04-05-N (www.supermagnete.nl/eng/R-10-04-05-N) ring magnets on the front and the back of the rotor respectively.





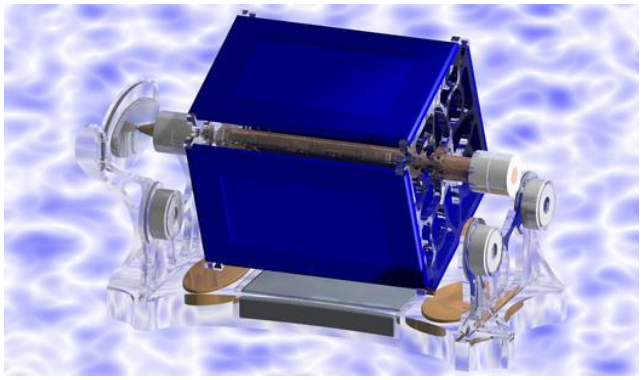
Then I built a mounting for the rotor, also made of polycarbonate. I put another four ring magnets into the depressions of the mounting. The rings in the rotor and the mounting reject each other and keep the rotor levitating.

I used a Q-40-20-05-N (www.supermagnete.nl/eng/Q-40-20-05-N) block magnet for a stator, which I embedded and glued into a Plexiglas plate.

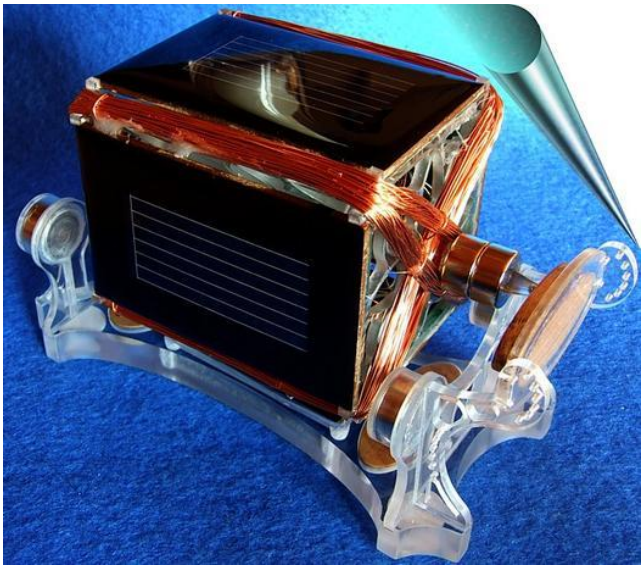
On this picture you can see the dark wood inlaid work (marquetry) pretty well, which I used for aesthetic reasons.

I embedded a small wooden plate and a tiger's-eye on the side. This semi-precious stone constitutes the counter bearing to the steel sphere of the rotor. That's basically an inlaid work in the inlaid work.

The stone has a Mohs hardness of 6-7. So, it should last for a while when the rotor peak rests on it.



That's how it looks schematically



Here you can see the complete motor with all windings. Only now, when everything was done, did I glue the magnets to the mounting and the rotor.

The rotor actually levitates in the magnetic field! I am very happy with the result.

YouTube Video: www.youtube.com/watch?v=zV14fdvPYjI

Mini Mendocino motor

Addition from Alain Gleyzes (2015): My goal was to build the world's smallest 3D-printed Mendocino motor. Instead of using one large block magnet, I embedded four disc magnets and needed only two ring magnets due to the light weight.

You can find a detailed documentation of the assembly at Thingiverse.com (www.thingiverse.com/thing:620961/#instructions).

Parts of the Mendocino motor

I used the following material:

- 2 carbon tubes (kite shop) or 2 wooden rods (12 x 0,3 cm)
- 4 solar cells
- 1 coil enamelled copper wire (0,2 mm)
- 4 disc magnets 12 x 3 mm (www.supermagnete.nl/eng/S-12-03-N)
- 2 ring magnets 10 x 4 x 5 mm (www.supermagnete.nl/eng/R-10-04-05-N)
- 1 pen tip

Articles used

8 x R-10-04-05-N: Ring magnet Ø 10/4 mm, height 5 mm (www.supermagnete.nl/eng/R-10-04-05-N)
1 x Q-40-20-05-N: Block magnet 40 x 20 x 5 mm (www.supermagnete.nl/eng/Q-40-20-05-N)
4 x S-12-03-N: Disc magnet Ø 12 mm, height 3 mm (www.supermagnete.nl/eng/S-12-03-N)

Online since: 19/05/2010