

## Application No. 356: Mendocino motor

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### 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.

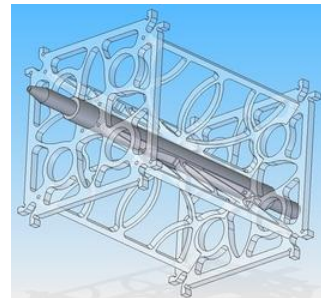
The rotor only touches a hard plate axially on one side and levitates otherwise, being carried by permanent magnets.



### 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.

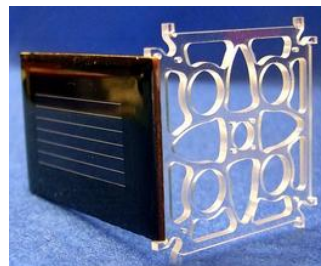
The solar panel is mono-crystalline and has a maximum current of approx. 200 mA at a voltage of approx. 0,5 V.

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.

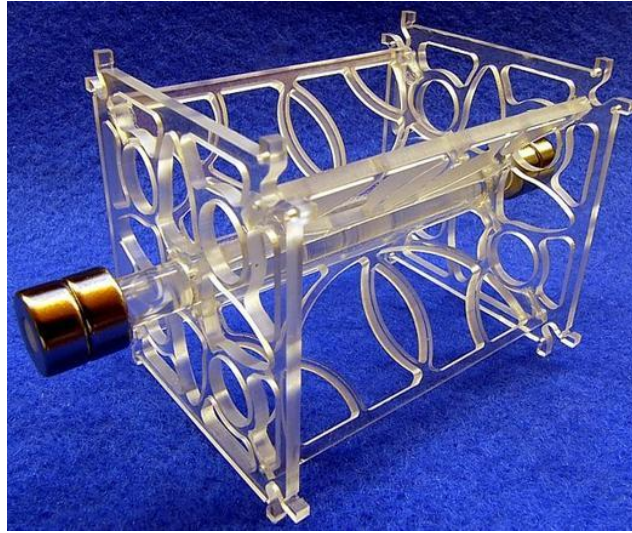
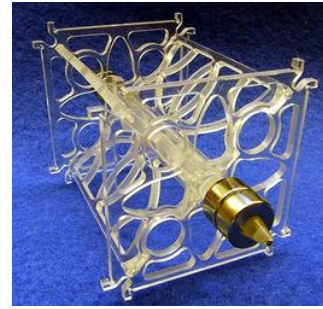


Here you can see the completely glued rotor. The axle is made of Plexiglas, because I couldn't find round polycarbonate rods.

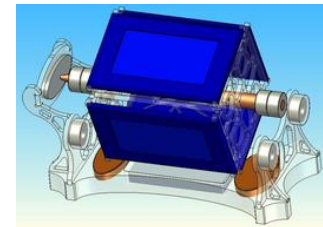
I glued a steel sphere (1,2 mm diameter) into the peak (right).

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](http://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](http://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.



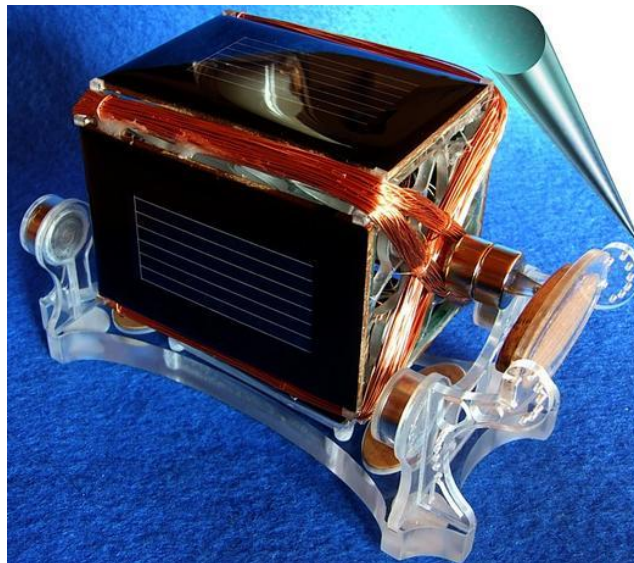
I embedded a small wooden plate and a tiger's-eye on the side. This semi-precious stone constitutes the counter bearing to the steel sphere of the rotor. That's basically an inlaid work in the inlaid work.

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=zV14fdvPYjl](http://www.youtube.com/watch?v=zV14fdvPYjl)

### **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](http://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](http://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](http://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](http://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](http://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](http://www.supermagnete.nl/eng/S-12-03-N))

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