

RE-ENGINEERING A FAN

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PURPOSE:

- learn how the fan works to create a useful, functioning system
- We will research mechanical and structural engineering to learn how the components of the fan works

PROBLEM:

How can you move air in
an effective and efficient
way?

**Hint: You'll be
a *fan* of this
one...**

Tabletop Fan

- A tabletop fan, is a medium size fan that can stand on the ground. It can rotate side to side (oscillation). Depending on the amount of wind you want to create, you can change the mode in a range between 0-4.



Hypothesis

- There are two main systems of the fan; the electrical and the mechanical. The mechanical system is there to provide structural support as well as actually cause the components to move. The electrical system is there to send information through wires and also power the fan.

DISASSEMBLY:

1. Started with separating the fan itself from the base.
2. Plastic cover of the motor had to be cut off in order to be able to access the motor and transformer.
3. The cage for the fan was able to be taken off by releasing the clamp
4. The base can be unscrewed to reveal the spring loaded switches.
5. The fan has been disassembled to the final components and it cannot be further taken apart.

Components of the motor

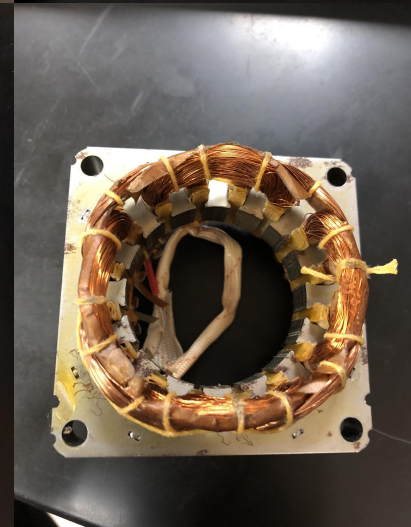
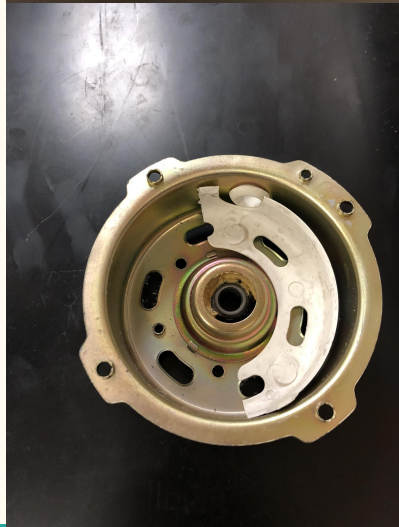
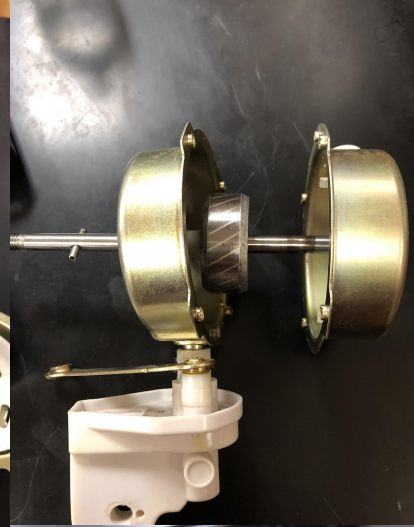
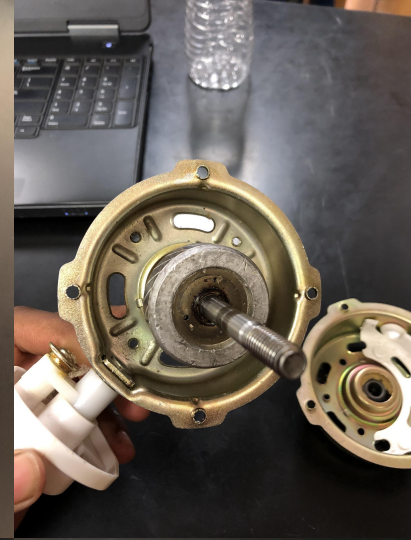
What does a simple electric motor contain within itself to create rotational motion?

ANALYZING THE ELEMENTS:

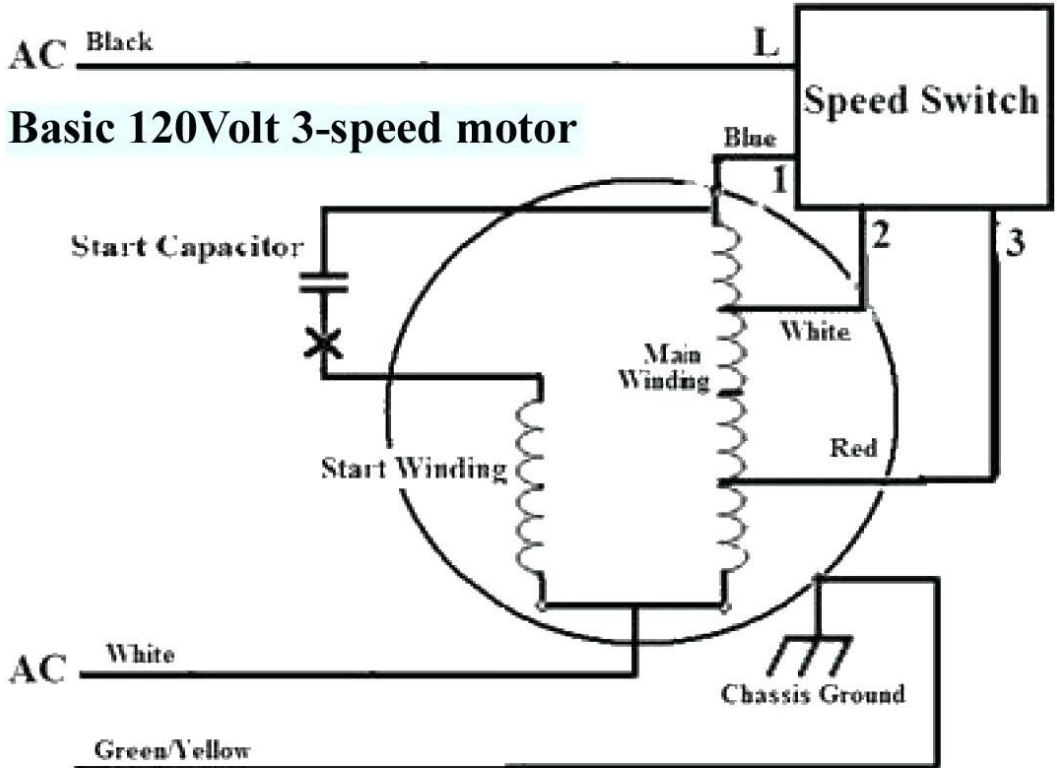
What materials are used, and why are they used in the fan as a whole as well as a complex system?

The Motor

- Copper coils
 - Copper
- Steel casing
 - Steel
- Steel axle
 - Steel
- Magnets
 - Either iron or Nickel
- Fan Capacitor
 - Electric Plates
 - Plastic Case



Schematics



How it works

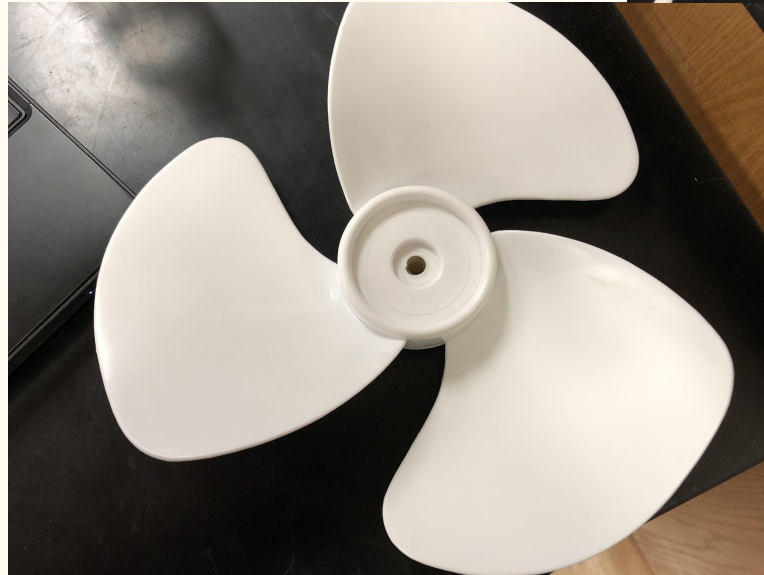
- Passing alternating currents through opposing pairs of magnets to create a rotating magnetic field
- Creating a magnetic field in the motors rotator making the motor spin.

Components of the outer, protective layer

What materials were used, how were they used, and what purpose do they serve to protect the internals of the fan?

Hard Plastic Parts

- Fan Blades
- Base of Fan
- Base Guard



Material Analysis

- Base guard
 - hard plastic. Cheap but still protects the wires
- Base
 - more hard plastic to hold the wire housing and spring loaded switches
- Switches
 - Made with steel springs, these switches help the user to change between different modes
- Electrical Wiring
 - Copper wires that run up into the motor

Material Analysis (cont.)

- Physical motor
 - Copper Wiring
 - Hardened String
 - Steel Chasse
 - Steel Axle
 - Possibly Iron
- Blade
 - More hard plastic
- Cage
 - Steel used to make sure nothing hits the blades while it is running.
- Seal
 - The same material the cage. Just to make sure the cage stays intact around the blade.

CONCLUSION(PRODUCT REDESIGN):

- Better materials (not hazardous)
- Fluid dynamics
 - Better blade shape?
 - Different material (possibly aluminum or carbon fiber blades)

Thank you!

