Constructing

Students build wind turbines in teams.

Together watch an instructional film on how to make a model wind turbine. Alternatively, you can watch the film by yourself earlier and then instruct students on how to make the model.

Clicking play will redirect you to YouTube website.

How to make a model of a wind turbine

The students work in teams. They share tasks: some members of the team build a generator, some construct the rotor, attach magnets to the stick and balance the whole system, whilst the others design and make a propeller. Next, the students will combine all parts into working models.

Monitor the construction of the individual parts. Make sure that each person in each team is allocated a task.

The generator

Materials for one wind turbine:

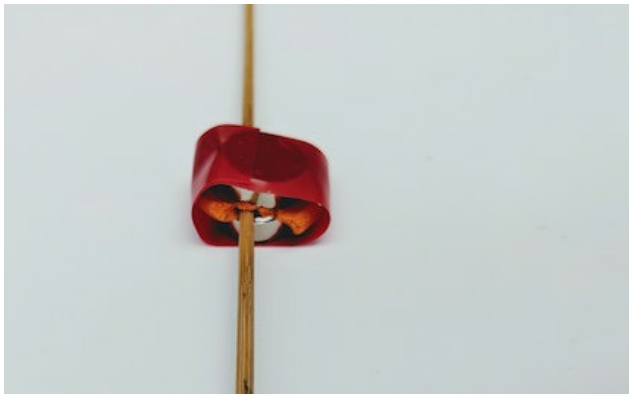
- Round plastic bottle - approximately 5-7 cm high, 4-5 cm in diameter
- Thin copper winding enamel insulated wire - 0,2-0,5 mm in diameter
- Red LED diode (preferably with a transparent cover)
- Insulating tape

- Neodymium magnet – 2 items, size 0,6 in x 0,6 in (1.5 cm x 1.5 cm)
- Wooden skewer
- plasticine
- Scissors or knife

Instructions on how to make the generator:

1. Unscrew the cap of the plastic medicine bottle.. On the sides, cut two incisions (slits) opposite each other (broad enough for the skewer to rotate in).

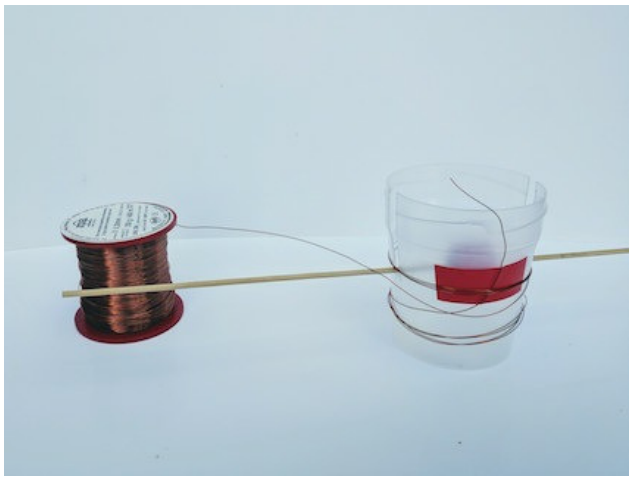
2. In the middle of the wooden skewer, attach two magnets using insulating (duct) tape. Tu secure the magnets better, put the piece of plasticine between them. You can additionally wind insulating tape around the skewer to prevent it from moving laterally when you insert it in the slits in the plastic bottle.



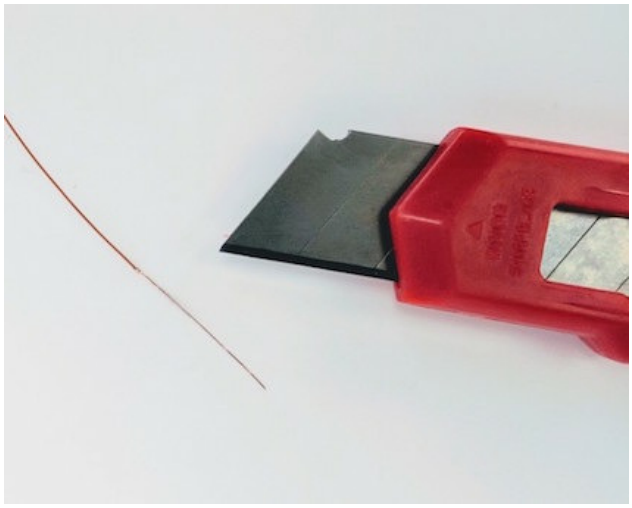
4. Place the skewer with magnets in the slits in the bottle (the skewer should be able to rotate freely but not move laterally).

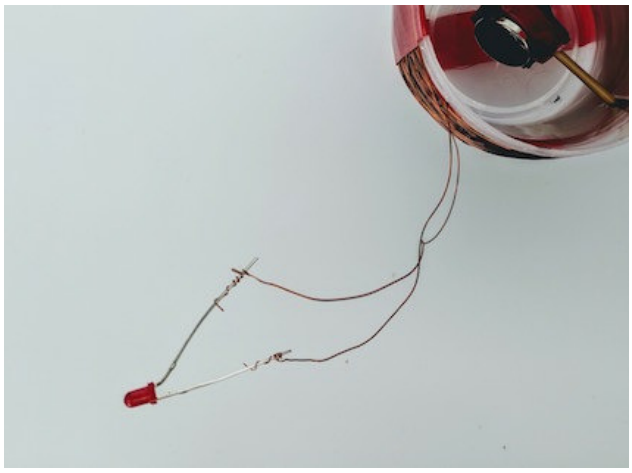
3. Next, wind the winding wire around the bottle. When you start winding you can, for convenience, attach the beginning of the wire to the bottle using duct tape. Once you have finished winding you can also, for convenience purposes, attach the end of the wire to the bottle with duct tape.

The wire should be wound approximately 250-300 times. The greater the number of windings, the better.

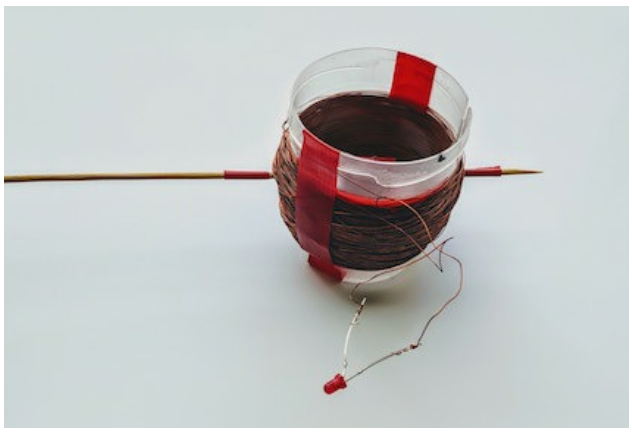


4. After completing the winding, remove the enamel form the endings of the wire (approximately 3 cm on each end) and connect the ends of the wire to the diode.





The generator is ready.



Rotor

Materials:

- Styrofoam disc - about 3-5 cm in diameter
- Cardboard
- Scissors
- knife

Instructions for building the rotor:

1. Make several (4-8) incisions (slits) around the circumference of the Styrofoam disc at evenly spaced distances.
2. Cut out the rectangular blades (measuring about 2 cm x 4 cm) from the cardboard.
3. Insert the cardboard blades into the slits.

4. Mount the rotor on either end of the generator skewer. You can use plasticine to attach the rotor firmly to the skewer.
5. Also attach a piece of plasticine to the opposite end of the skewer to balance it. The wind turbine is ready.

Experiment

Students perform the experiment and check whether their model wind turbines really works. They observe the whole cycle during which energy is obtained from wind and converted into electrical energy.

Materials (in addition to the model wind turbine):

- a hairdryer or a fan

Instructions for the experiment:

1. Point a source of wind (a hairdryer or a fan) towards the wind turbine.
4. With a sufficiently strong gust, the diode will light.