Tesla Turbine Puts Points on Pesky Pencils

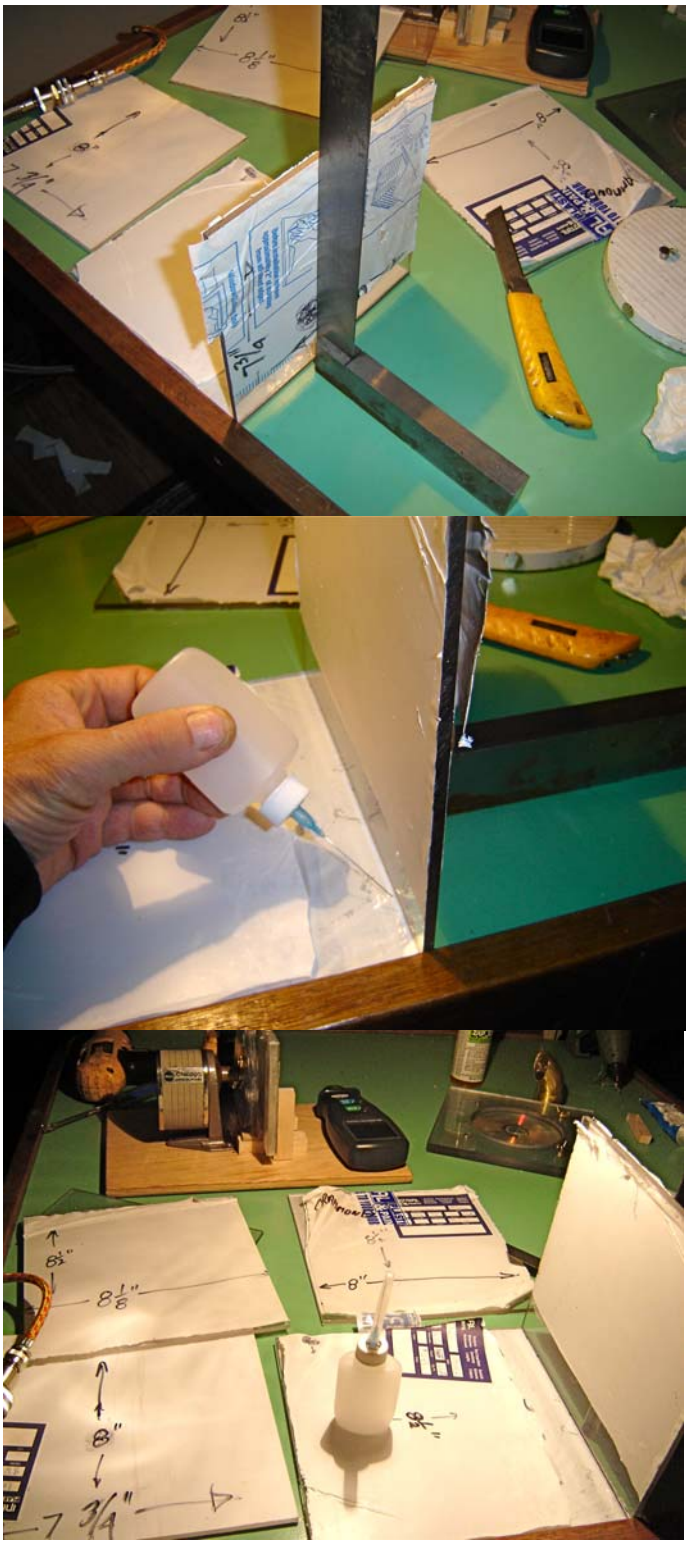
Maybe there is a good reason for interest in Tesla turbines. After all, Nikola Tesla referred to his turbine in his memoirs as, "the greatest of my inventions." That means a lot coming from the man who invented alternating-current electricity and harnessed Niagara Falls to produce electric power, developed wireless power, the automobile speedometer, ignition coil, and spark-plug.

Rick Crammond has found a way to improve the Tesla turbine design and give it an update with modern materials in his Tesla Turbine Pencil Sharpener.

Rick's Tesla turbine might just be the simplest form of functional turbine in the world. The prototype uses a plastic compact-disc (CD) jewel-case as its housing. The only moving part in the turbine comprises two clear CDs with four neodymium disc magnets bonded between them and spaced 90 degrees apart. This type of turbine relies solely on air to act as a bearing on the disc surfaces. But more importantly, because the turbine uses the magnets to couple to an external device--the pencil sharpener--it needs no shaft, no shaft bearings, and no shaft seals.

The magnetically driven pencil sharpener attachment Rick built reaches speeds up to 2200 rpm (so far) as compressed air drives the two CDs. So, it will put a point on a pencil – or grind it down – very quickly.

The turbine itself can reach speeds of 8,000-to-12,000 rpm before it self-destructs. So, Rick built a "bullet-proof" polycarbonate containment box to take any punishment in case of failure. A foot-controlled valve controls air flow into the turbine and serves as an emergency shut-off.



This type of turbine power source adapts well to modern technology. The energy of a small solar panel could charge a 12V storage battery. In turn, the battery could run a small compressor to pressurizes an air-storage tank. The stored air running through the

turbine would suffice to sharpen several pencils with "free energy" each day. The whole system is not particularly efficient, but it sure is fun!

Instructions

Here is a YouTube video Rick produced to show his Tesla turbine in action: http://www.youtube.com/watch?v=Xabkw_KiLGg. Watch the video before you start to build a turbine.

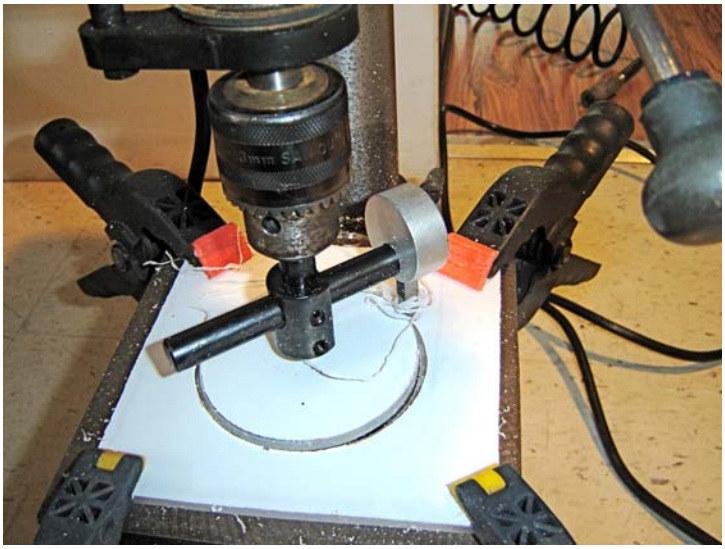
Read the following instructions before you start any construction.

Mark one CD with radial lines 90 degrees apart. Center one 3/32-inch-thick magnet on each of the four radial lines, equidistant from the CD's outer edge. Mark each magnet's position. Slightly roughen the flat surfaces on each magnet (120-grit sandpaper works well) so glue will adhereto these surfaces. Glue the magnets to one CD and let the glue set. Put glue on the top of each magnet and attach the second CD so as to sandwich the magnets between the concentric CDs. Use a CD spindle to center the discs while the glue sets.

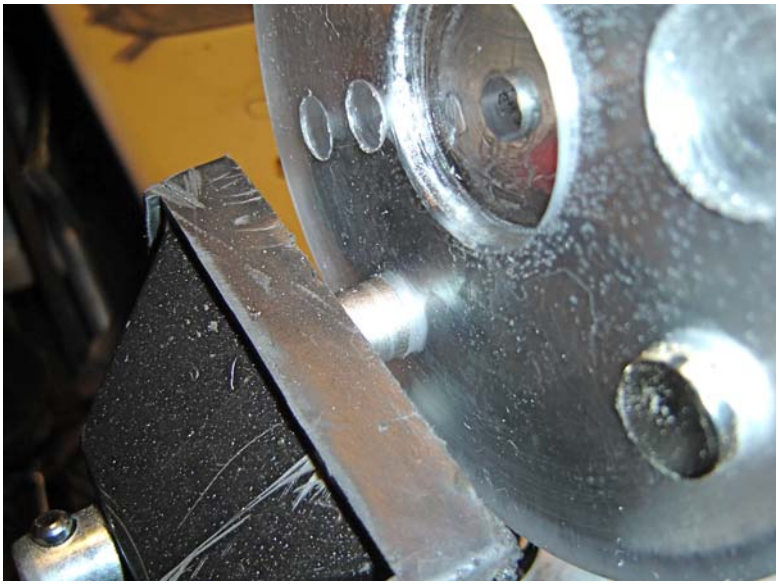
Measure the diameter of the CDs and then use a compass to carefully draw a circle of the same diameter on the 1/4-inch polycarbonate material. Ensure that you scribe or lightly punch a mark at the rotor's center. Cut out two (2) circular pieces of polycarbonate material with the same diameter as the CDs. (You can trace a CD outline on the plastic, but be sure to mark the center.)

You can substitute one piece of 3/8-inch polycarbonate for the two 1/4-inch pieces described above. The 3/8-inch-thick material makes for less work. DO NOT use acrylic for the plastic disc or discs. It is not tough enough.

This circular piece--the pencil-sharpener flywheel--will attach to the pencil sharpener (or other device of your choice). As an alternative, use a circle-cutting attachment for a drill press as shown in the pictures. Be sure the polycarbonate sheet is clamped well to the drill press. When using tools, always wear safety glasses or safety goggles to protect your eyes!



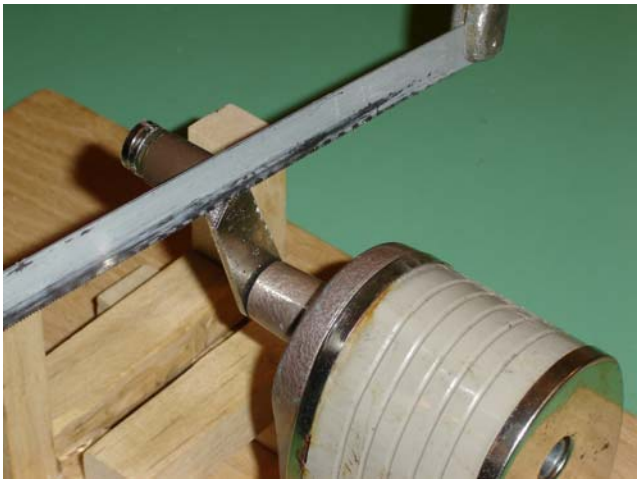
After you cut out the polycarbonate flywheel disc, place it on top of the rotor-and-magnets assembly and carefully mark on it the position for each of the four magnets. Mark on the polycarbonate flywheel the center of each magnet as a drill-bit alignment point. Place the flywheel disc in a vise or on a drill-press work table and drill a 1/2-inch diameter hole for each of the large magnets. Secure a large magnet in each hole in the flywheel so it REPELS the corresponding magnet in the turbine rotor. If the magnets attract each other, the turbine will not work.

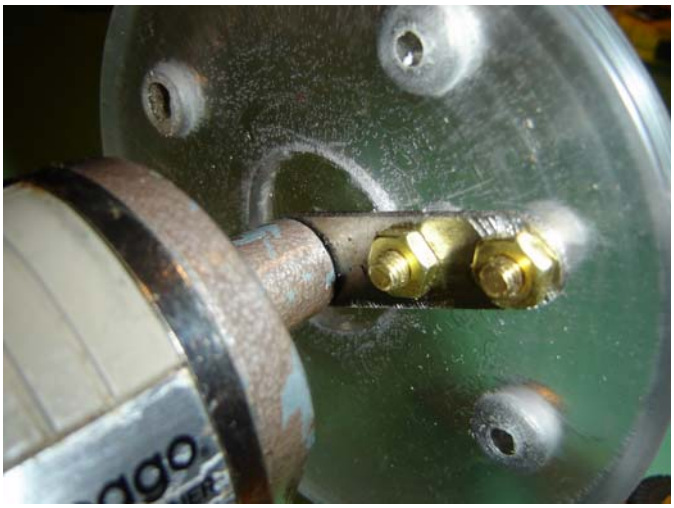


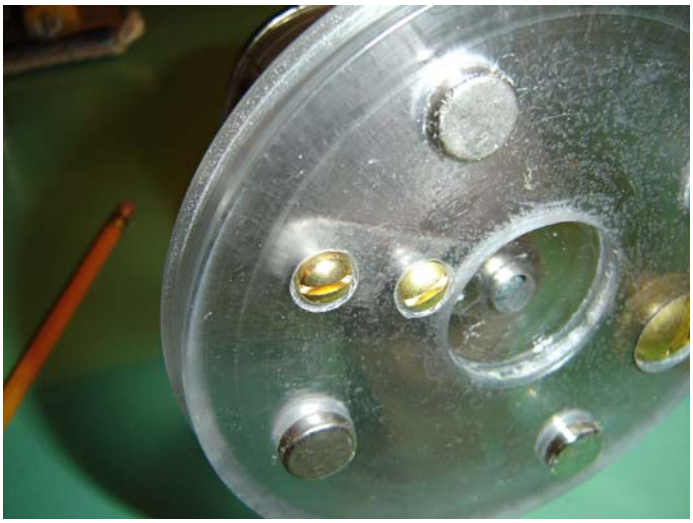
Use a pair of pliers, a vise, or vise-grip pliers to force the 1/2-inch-high magnets into the four holes drilled in the flywheel. Let the magnets protrude about 1/8-inch on one side of the flywheel. This face will magnetically couple with the turbine's rotor. The 1/8-inch protrusion provides some clearance for the heads of bolts used in the steps below. (Or, you can use flathead machine bolts and countersink the holes.)

You must drill a hole on the rotor for the pencil-sharpener's handle. Ensure you can see the center-point mark on the plastic rotor. Center it on the center of the pencil sharpener's shaft and mark the center of the point at which you must drill a large hole for the handle. Alternately, remove the crank handle knob from the pencil sharpener by

grinding, hacksawing, or drilling the knob's rivet from the crank handle. Then attach the handle to the flywheel with a machine screw.







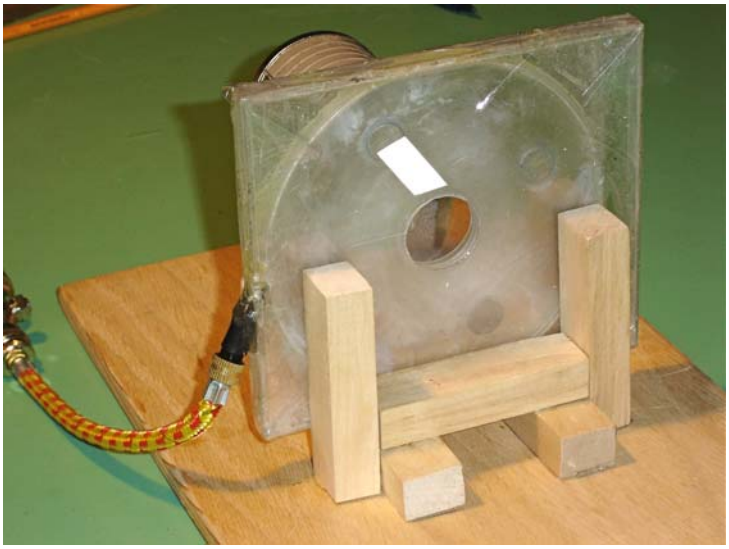
Draw a line between the point you marked above, through the rotor's center to the opposite edge of the rotor. You will later place a counterweight along this line.

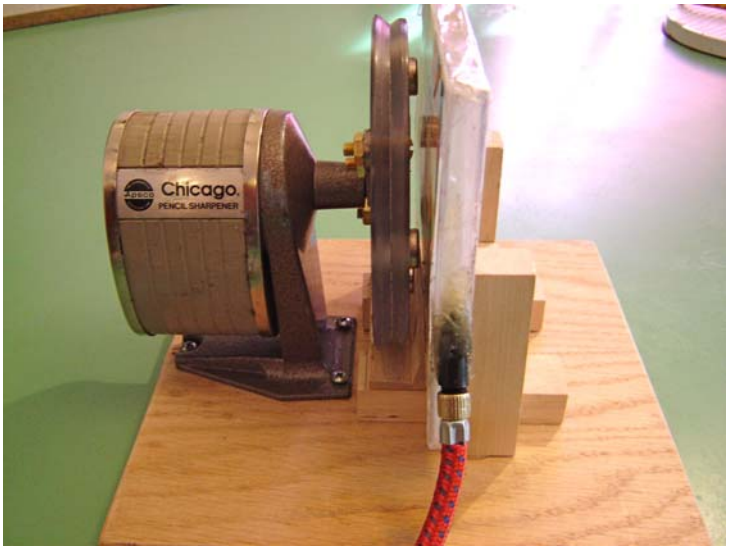
Drill the appropriate hole size to accommodate the pencil-sharpener's handle. Also drill a hole at the rotor's center to accept the sharpener's center shaft.

With care, you can drill through polycarbonate, and similar materials. For a better drilling "experience," use drill bits specifically made to drill through plastics without chipping or cracking the plastic. For plastic materials and drill bits, visit: <A HREF = "http://www.eplastics.com">www.eplastics.com</A>. If you use a drill press, always clamp material to the worktable.

Drill a small hole along the line drawn between the pencil-sharpener's handle hole, the center hole, and the outer edge. Use a machine screw and several nuts and washers to create a counterweight for the sharpener's handle. The threaded part of the screw should point toward the pencil sharpener. When you have the proper weight, the rotor should be balanced and when spun by hand, it will come to "rest" in random positions.

Use pieces of wood to mount the pencil sharpener and the CD case. The case should come close to, but not touch, the pencil-sharpener rotor. A spacing of about 1/8 inch provides a "sweet zone" for magnetic coupling of the turbine rotor and the pencil-sharpener flywheel.

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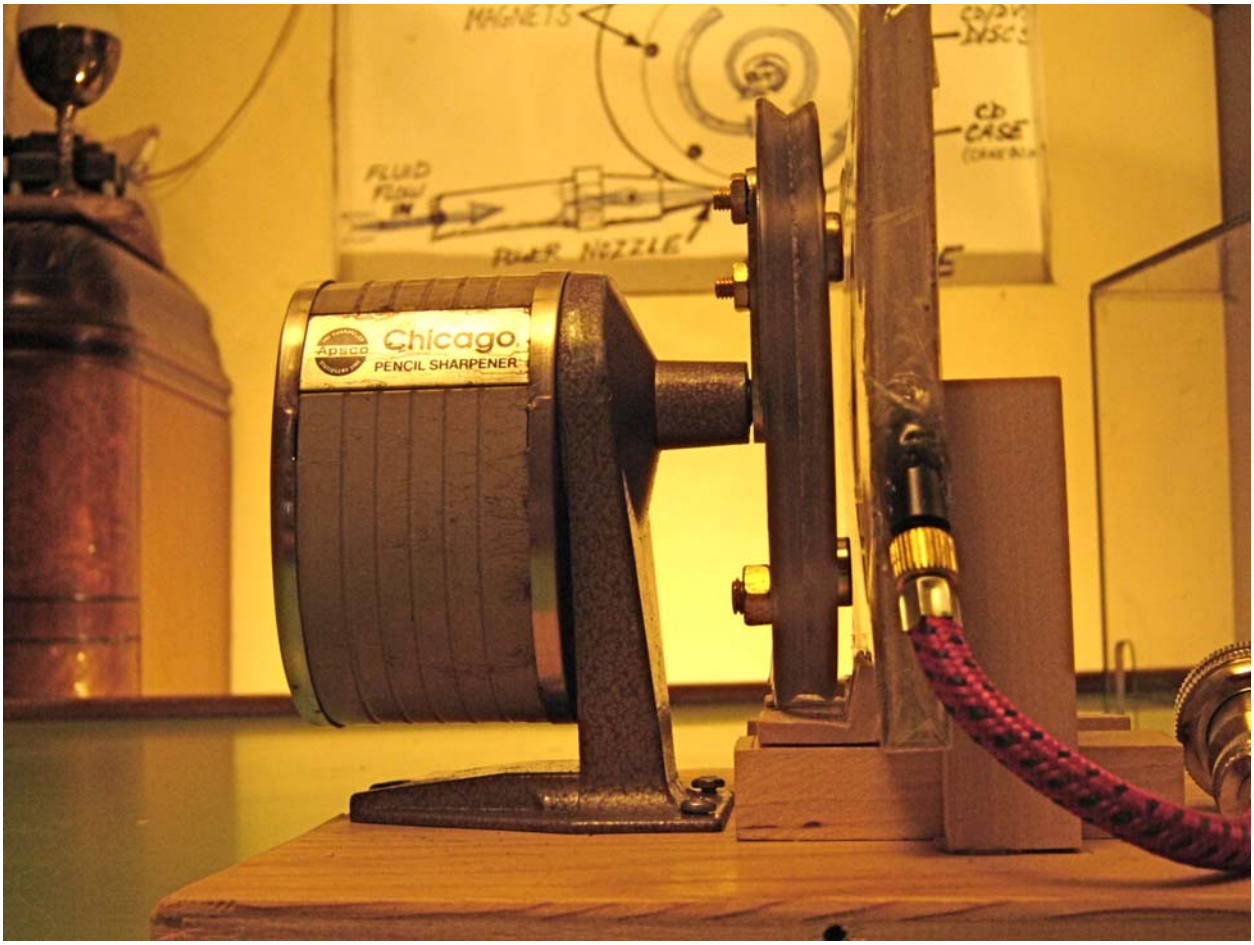
PENCIL SHARPENER



(Note that the bevel on the edges of the polycarbonate flywheel discs shown in the photos results from the tool used to cut them on Rick's drill press. You do not need a bevel on the flywheel.)

You must prepare the CD case by gluing in a circular guide for the discs. This can be made from plastic such as that from a CD spindle (cakebox) cover. Cut the case with shears to slice off a circular piece about 1/4 inch in thickness. Fit this piece into the turbine CD case by making it fit closely to the discs. Hot glue works to support this. Be sure that there is no friction between the discs and the guide.

Drill a small hole into the CD case, as shown in the video, and glue the pneumatic-toy inflating nozzle so air will blow between the CD-and-magnets assembly within the CD case. Hot glue works fine for this. You might have to reposition the nozzle, so before you mount it permanently, use compressed air to spin the CD assembly in the case and note the position of the nozzle that produces the best energy transfer from the air to the CDs. Then glue the nozzle in place.

The CD case must also have a 1-inch hole cut in the middle center of the case, on the opposite side as the pencil sharpener. I used a 1-inch hole saw. This is the exhaust outlet, which is always at the centre on a Tesla Turbine.

To learn more about Tesla and his inventions, visit the Tesla Memorial Society of New York website at http://www.teslasociety.com

Learn more about Tesla turbines at:

http://en.wikipedia.org/wiki/Tesla_turbine

http://www.stanford.edu/~hydrobay/lookat/tt.html

The nature of this project lends itself to experimentation. The materials list below gives you a head start, but you can adapt the design as you wish and can try other arrangements of the apparatus. *Design News* strongly encourages you to fabricate the protective enclosure for the Tesla turbine project to prevent injury.

Materials

1 Compact-disk jewel case

2 Compact disks

4 Neodymium disc magnets, 1/2-inch diameter x 1/2-inch-high, K&J Magnetics #D88

4 Neodymium disc magnets, 1/2-inch diameter x 3/32-inch-high, K&J Magnetics #D803

1 Pneumatic-toy inflating nozzle

1 Polycarbonate sheet plastic, 1/4-inch thickness, or equivalent

1 Hand-crank pencil sharpener

Miscellaneous:

Wood for base, wood screws, machine screws, nuts, washers, cyanoacrylate glue, drill bits for plastics, compressor or compressed-air source. Find K&J Magnetics at: www.kjmagnetics.com