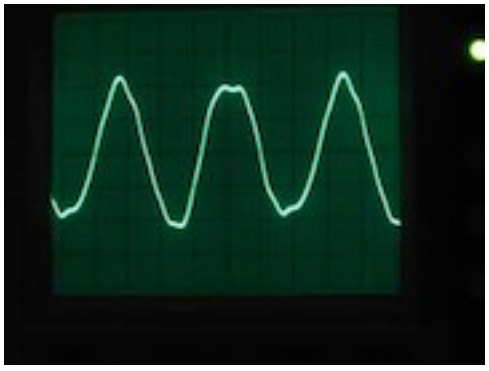
SeaGull DIY
28"x 36" VAWT Design

Seagull 75 Development

The Seagull 75 was developed over three years of testing and is now available as a do it yourself design utilizing common materials and requiring common tools and skills. The design balances cost with performance, simplicity with ruggedness and size with output. It can be used to charge 12 v batteries and can be completed in two to three weekends.

Unique design
The dimensions of diameter, height and blade profile are all in balance. They provide for very precise startup at about 5-7 mph wind speed, charging at 8-9 mph and ability to handle very high wind speeds.
The alternator is unique in that its output closely matches the exponential increase in power as winds increase.

This is accomplished by using very spikey AC output from the single phase design. At slow speeds a voltage spike just high enough to charge occurs at @10x/second. This DC pulse is effective but draws little power from the turbine in light winds.



As winds increase these spikes may be 5x higher and occur at @30x/second. Ordinarily an alternator would stall a turbine when clamped to a 12 volt battery voltage. If you look at the AC output on a multi-meter it might appear that voltage is too low to charge, but a multi-meter will average the voltage and not show the peak voltage which may be twice as high as the meter shows.

Until now, building blades, rotors and alternators for wind turbines was beyond the scope of the DIY project. And building a non-cogging alternator was a very expensive endeavor. This design obviates the need for expensive machining, costly epoxy resins, expensive magnets and bearings.

Tools required

Screw drivers
Jig saw
Drill
Scissors
Paint brush
Wire cutters
Wrenches

Materials list

Hardware Store:
#6 wood screws ½ long
#10 wood screws 2" long
#8 wood screws 1" long
Strapping tape
3/8" plywood handy panel size 2' x 4'
Six 3/8" diameter x 48" long wood dowels
One ¼" diameter x 36" long wood dowel
6 ceramic magnets 1-7/8" x 7/8" x 3/8" common hardware magnets
Paint can lid 6.5" diameter
Two packs of Fiberglass cloth and 1 quart fiberglass resin
3M super 77 contact spray adhesive
Super glue
1.5" EMT conduit coupler
½" OD, 3/8" ID alumin tube
3/8" OD bolt 5" long

Small roll of galvanized or stainless steel wire @ 18 gauge

Art Supply:
Poster board 6 sheets from art supply (22" x 28" heavy card stock material)

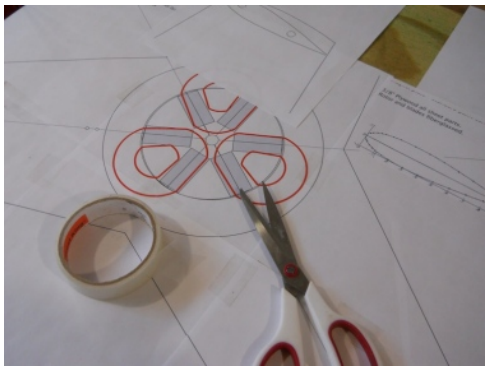
Radio Shack:
Bridge rectifier
Wire

20 gauge magnet wire 1.5 Lbs

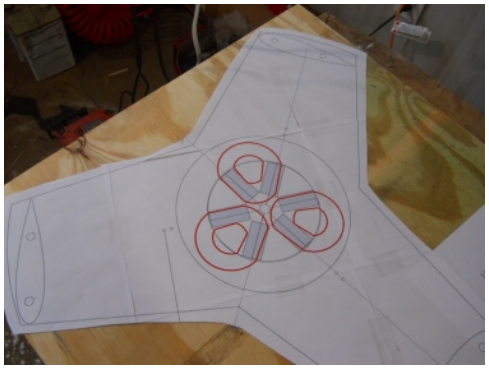
The most difficult thing to just run out and get is the magnet wire. This is something you may end up ordering, or scavenging from an old transformer or motor.

Lynx Wind Power sells the coil sets and magnets.

Rotor and Blade Assembly

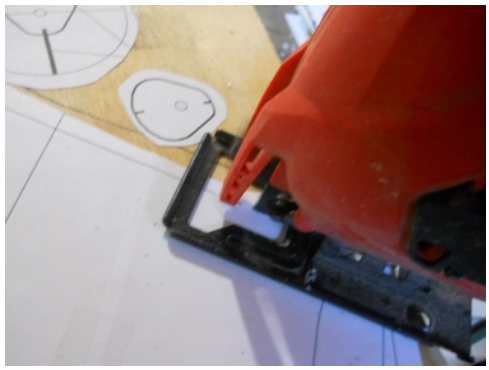


Step 1.
Print out the templates of each pdf file and tape together and study them. Setup the larger rotor pdf to print as a poster in the print menu so the drawings aren't scaled down to a single page. Get familiar with the parts, how they go together and what the steps are.



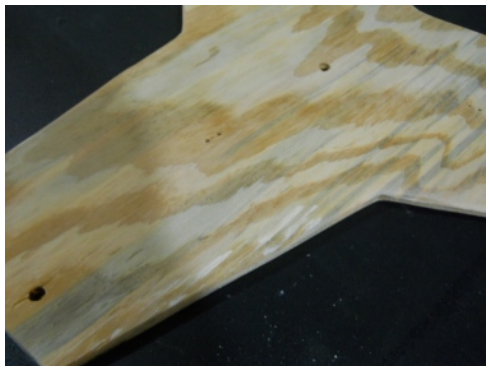
Step 2.
Tack glue the template for the turbine's rotor disk to the plywood. A light mist of 3M77 on the plywood is a good way to do this. Try to position the template so you conserve as much space as possible. Using a handheld jig saw cut through the black line outlining the shape.

Not inside or outside, but right on the line.



Step 3.
Drill the holes for the blade spars on a drill press to keep them straight through, or just try to keep them square to the plane of the rotor. Accuracy on these holes is important for proper running.

Step 4.
Drill holes for the shaft and bracing wires.

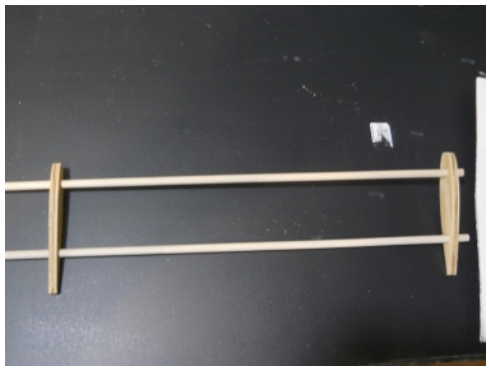


Step 5.
Sand all edges and set this part aside. You can streamline the rotor edges but it is not necessary. It will help draping the fiberglass cloth if the edges are rounded/softened instead of an abrupt square edge.

Step 6.
Print out the blade former template and tack onto a double thick stack of 3/8" plywood. Put a #6 wood screw through each blade former between the 3/8" holes to hold the formers together as you cut the pairs out. First drill the 3/8" holes accurately or line up will be difficult and the blade may deform. Cut out 12 blade ribs.

Cut right on the line and sand smooth on a power sander for quick work. If the sanding is going slowly, start with 40 grit to get them to shape and then finish with 80 grit. A little roughness is fine to help the adhesive later.

Step 7.
Trial fit the parts sliding the dowels in through the blade formers and into position. Now is the time to make any adjustments so the blades will take shape more easily.

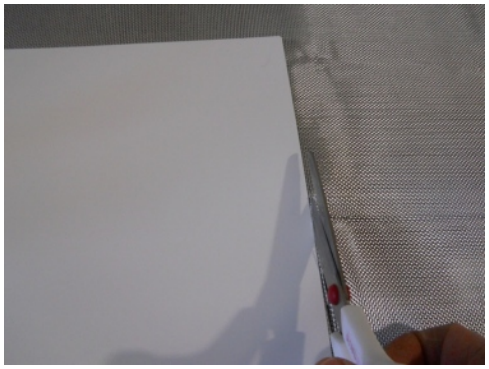


Step 8.
Cut the poster board into 18" x 13" pieces. Use a T square or a poster board corner piece to make sure the pieces are perfect in dimension. You need 6 of these pieces.

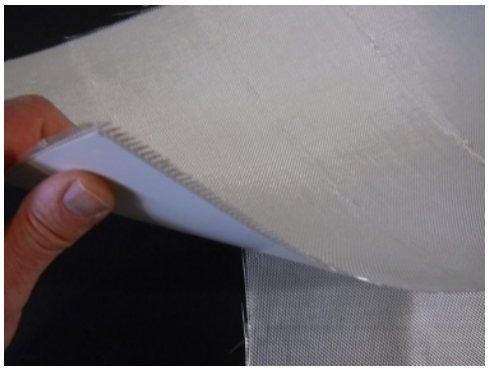
Step 9.
Unfold your fiberglass material carefully on a clean table covered with something to protect it from glue. Drop cloth, newspaper, plastic sheeting is best. Try to get all the wrinkles out of the fiberglass cloth

and if needed, tape the edges down to keep it flat.

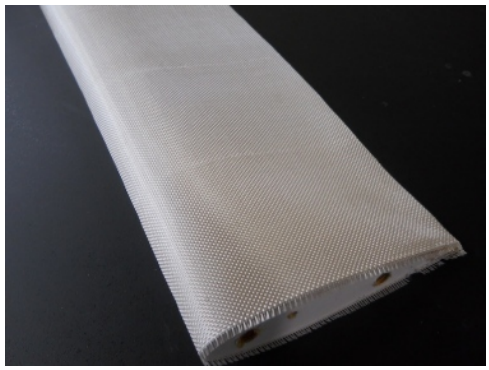
Step 10.
Get your 3M 77 contact adhesive. Spray mist the glossed side of the poster board you cut and the fiberglass cloth roughly the area of the 18" x 13" poster board. Let sit for 2-3 minutes or until it is barely tacky. Carefully lower one edge down to an edge of the fiberglass cloth. Slowly drop the poster board on while smoothing it down. You don't want any wrinkles.
Repeat for remaining poster boards. You may find you can do several together if you plan out the space.



Step 11.
Once these pieces are dry, carefully trim the edges of any overhanging fiberglass cloth.



Step 12.
Take a scrap of the poster board and practice forming it into an airfoil. Notice how if you roll it too abruptly it will buckle. You want to roll it slowly over the rib formers and evenly with both hands pulling back and down.
You can preform the LE roll by gently pulling over a ¾"-1" tube or dowel, broom handle...etc.

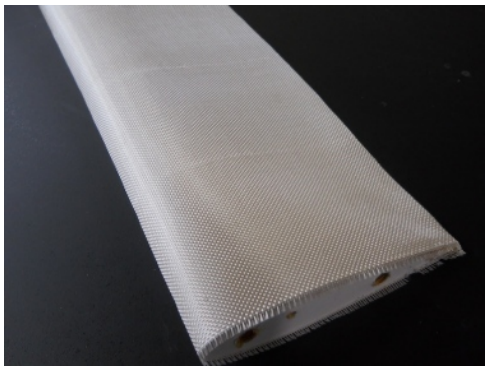


Step 13.
Use a piece of scrap wood or poster board to make a spray guard. You want to spray a ½" strip around the perimeter of the poster board. Let the glue tack up for a few minutes.

Step 14.
Carefully press the ribs down, lined up to the edge of the poster board side of the blade material leaving 1/2" overhanging the TE. Roll the

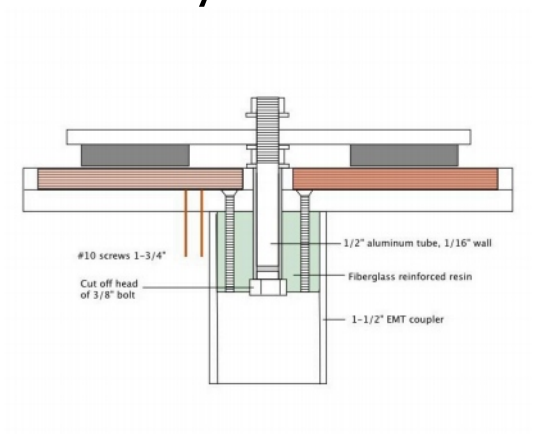
ribs along the edge until the LE curve is just starting to form.
Turn the board around so the TE is away from you. With both hands slowly roll the blade over the LE and apply pressure back and down until the TE lines up. Run your hand along the middle and out to seal the TE. Check the joint along the ribs and smooth out.

Staple the trailing edge with a paper stapler every two inches. The resin in a later step will soften the contact adhesive and these staples will keep the seal together. Staple through the fiberglass/poster board into the rib former at a couple spots each side. You can sand these off when the resin dries later.



Step 15.
Repeat until you have all 6 blade sections done. Set aside to dry.

Seagull Alternator Assembly



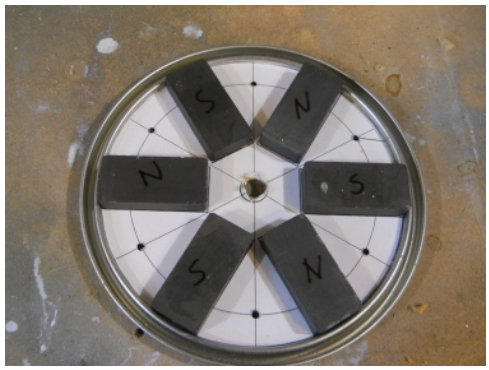
Magnet Rotor
Choices choices
If you want to go low cost, you can use ceramic magnets that you find at the hardware store. They are about 89 cents each! With these you wont easily reach 12 volts without at least 12-15 mph winds and then the power is low. You get what you pay for.
There is a way to boost the voltage using a simple transformer you can get at Radio Shack. See below*
Or you can buy some 1.5" x .75" x .25" Neo magnets for more power, or you can cut a larger steel disk and use 2" x 1" x .25" Neos for max power.

*To easily boost voltage using the ceramic magnets you will run the AC to the 6 or 12 volt outputs of a standard 110:12 volt transformer. Run the heavy black leads to a rectifier and then to the battery. With a hand-spin the ceramics can reach 35 volts using the transformer.

The input AC is boosted almost 10-20x. You don't get something for nothing. The amps drop 10-20 fold.

If you can't decide, the Seagull design allows for easy upgrade by just changing out the magnet plate.

Step 1.
Tack glue the magnet plate template to the paint can lid. Drill holes in the paint can lid using the template. This will be a 3/8" hole centered carefully, and six holes for attaching to the rotor.



Steel magnet plates are available at www.lynxwind.com

Step 2.
Lay out the 6 magnets as shown on the template. Use super glue adhesive to tack them down. You

can set this aside until it is fiberglass resin time.

Note: You can change this magnet plate out later using stronger magnets such as 2 x 1 x.25" Neo magnets for more voltage.
You can also use a thicker steel backing plate for higher voltage.
The backer can be a square piece of steel, or a round piece.
Generally a steel 1/3 - 2/3 the thickness of Neo magnets is sufficient. For the ceramic magnets, the paint can lid is Ok.

Stator

Step 3.
Tack glue the stator coil retainer template to the 3/8" plywood. Drill a 3/8" hole inside the area shown as "cutout" to get a jigsaw blade started. Cut out the area for the coils. Don't drill the pilot holes for the stator clamping wood screws yet.

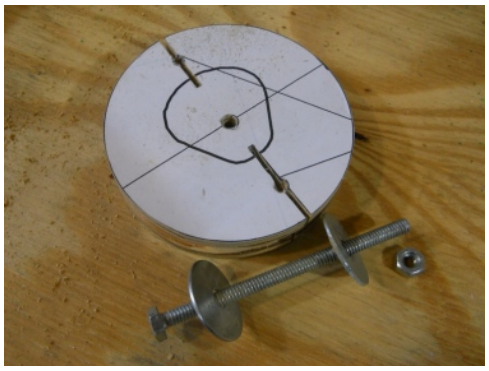
Step 4.
Tack glue a stator disk template onto the 3/8" plywood. Cut out right on the line. Now repeat and cut another piece.

Step 5.
Now take the two stator pieces and placing the cutout coil retainer on top clamp them and pilot drill with a 1/8" drill bit where shown.
Drill two more 1/8" holes for the brass bolts that will be the AC attachments under the alternator.

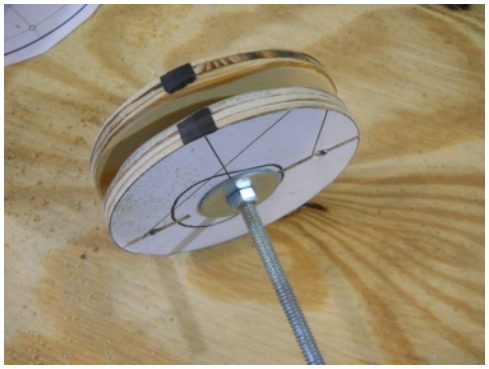
Coils

Step 6.
Coil sets are available for purchase at www.lynxwind.com

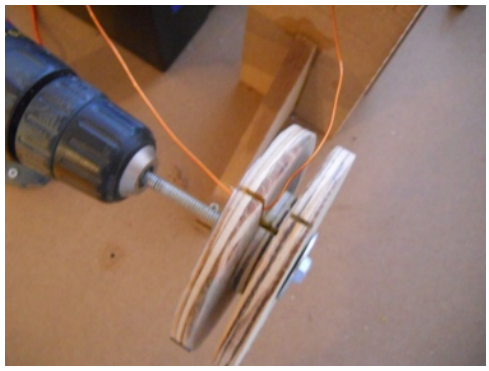
Cut out the two 4" disks for the coil form using the template. Drill a ¼" hole where shown. Bolt these two pieces together with a ¼-20 bolt and nut and spin in a drill holding coarse sandpaper at the edge to make them uniform. Bevel the edge so that magnet wire will not get caught on the spool. Cut slots where shown towards the center.



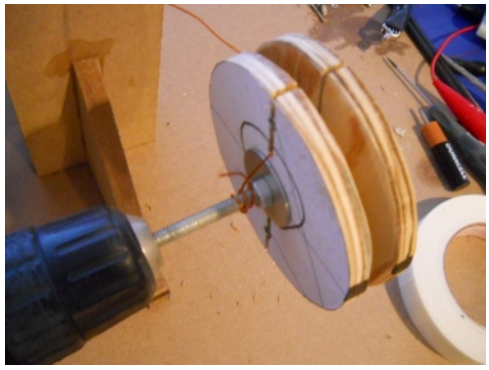
Step 7.
Using the template for the coil inner form, cut out and drill with a ¼-20 drill bit. Lightly sand until smooth and slightly bevel the edge to make coil removal easier.



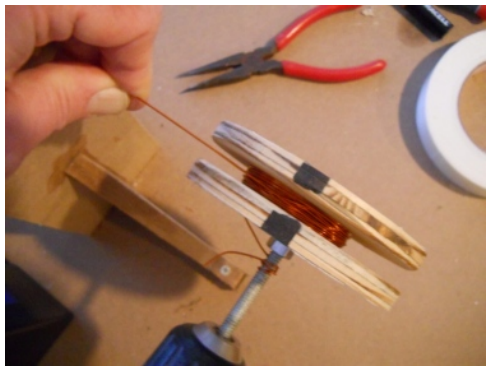
Step 8.
Bolt the disks with the inner form together tightly and re-cut the slots so that the inner form now lines up with the slots in the outer disks. Make a mark on the outside to help with lining up the slots.



Step 9.
Bolt together the coil former and chuck into a handheld variable speed drill. Put your magnet wire spool on a dowel chucked in a vise so it will turn freely as you wind the coil.



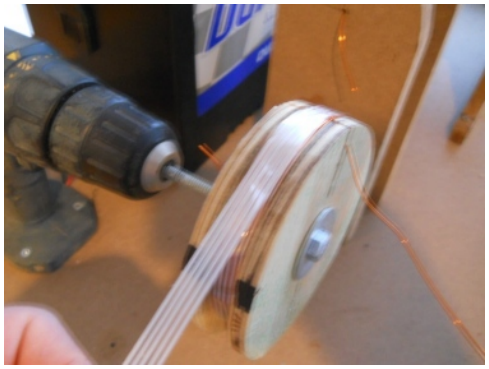
Step 10.
Take a 6” length of magnet wire and pull through the slot and turn around the bolt a couple times.



Always wind your coils in the same direction. Feed onto the top and run counter clockwise.

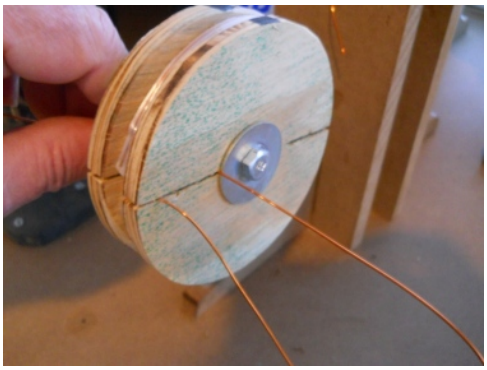
Hold the feed wire in your right hand's fingers applying some pressure, and start winding. You want the coil to be wound tight and without a lot of messy overlaps. By holding the magnet wire about 8" away from the coil form you can let the tension automatically lay wire side by side as you turn. Fill the coil form full to within 1/8" of the edge of the coil form disks at the fullest point.

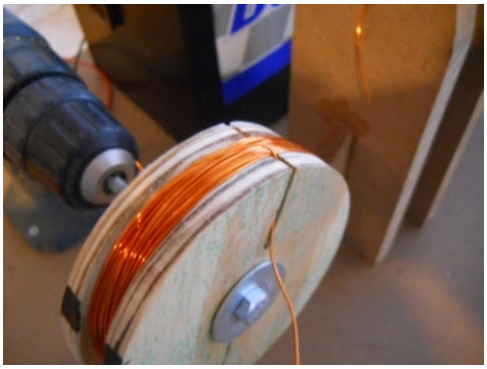
Step 11.
Take the wire and pull through the other slot and bend it down. Cut it off at 6". Take a fiberglass reinforced strapping tape and cut a 14" long length. Now snip this in half, and rip into two equal width pieces aprox 3/8" wide.



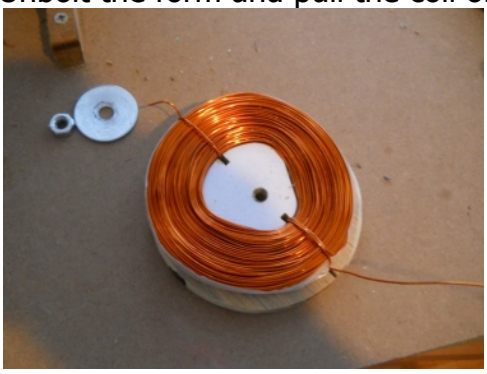
Take this tape and pull it around the coil.

Step 12.
Take the free ends of magnet wire and loop around through the slots and around the coil.

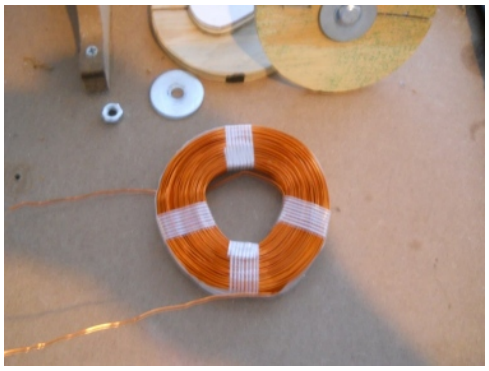




Unbolt the form and pull the coil off.



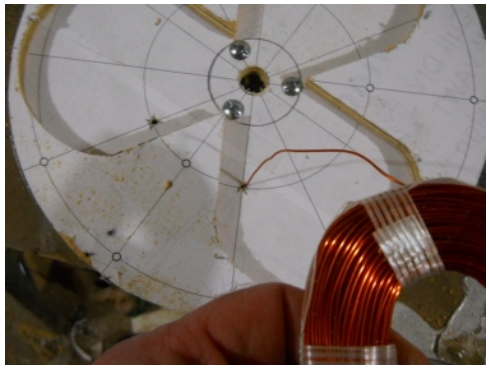
Take your strapping tape and tape around the coil legs at two places. Un wind the loose end wires and tape again at a third and fourth spot to retain the coil's shape.



Repeat for two more coils.

Step 13.
Pilot drill the base of the stator at the three places shown near the center and screw in three 1.5” long #10 screws . These will protrude down and will eventually give a good grip in the stator coupler to handle the torque.

This photo shows how the three bolts will fit inside the coupler.

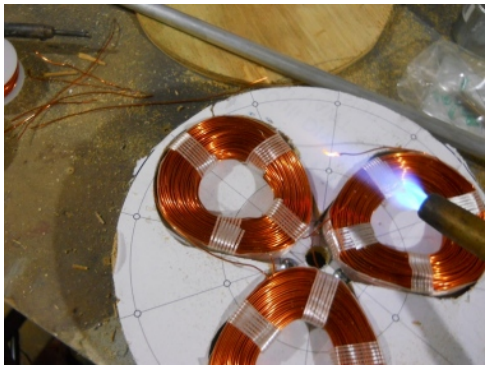


Note: After taking these photos a design change was made. Instead of exiting with the magnet wire through the stator bottom, it would be better to solder the AC wires to a brass (non-magnetic) 10-32 bolts and run these bolts down the exit holes. Then the AC connections can be made to these bolts with nuts for a more secure connection and less risk of breaking off a soft copper magnet wire. The pdf plans show this change.

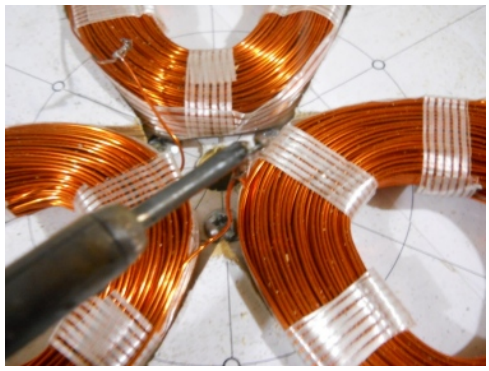
Clean 1.5” of enamel off the coil #1 outside wire, wrap around the brass bolt just under the head two times and solder. Push this bolt through the stator.

Make sure all coils are oriented the same way and make certain which wire is an inner coil wire and which is an outer coil wire.
Insert the coils into the stator coil retainer and on top of the stator base. This will be hard to do because the coils will have relaxed and become larger. You will need to bend them and reshape until they can be pressed in.

Clean the enamel off a 1" length of each coil by burning the enamel and then using sandpaper shining up the copper.



Take a start wire (inner wire) and an end wire (outer wire) from an adjacent coil and twist them together. Do this again with coil 2 & 3. **You must solder these joints.** Don't rely on just copper twisted. Tuck them in between coils towards the center where they wont contact any metal.



Important: Tuck all wiring as far away from the bearing tube as possible so that in a later step when you re-drill this hole there is no chance of cutting a wire.

Take the remaining wire, clean 1.5" to shiny copper and solder it under the head of the remaining brass bolt for AC connection. Push this bolt down through the base stator plate.

This should be coil #3's inside wire. Drip some hot wax to seal these exit holes.

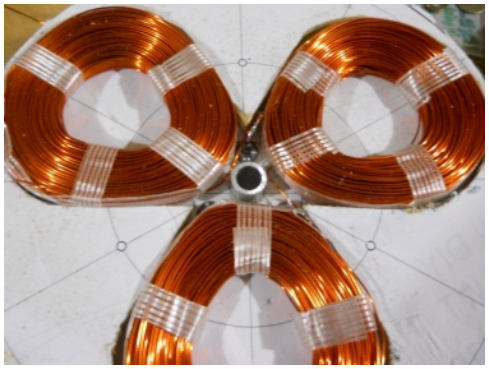
Step 19.
Find a 3/8" bolt that fits nicely in the ½" aluminum bearing and is 5" long.

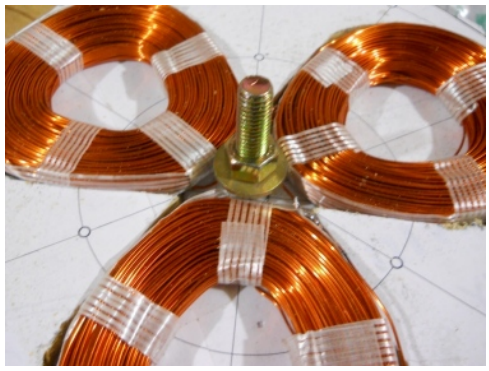
Cut off the head at ½" and grind the cut end smooth and with a slight bevel so that the turbine can easily drop into the bearing tube.

Take the ½" aluminum tubing with a 1/16" wall and cut this tubing with a hacksaw so that it is ¼" longer than the unthreaded length of the bolt.

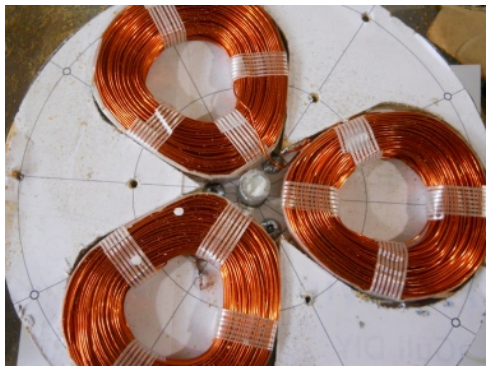
After the stator is completely finished a last step is to epoxy this oil seal (bolt head) into the cut end of the tubing. This will leave the virgin side of the tubing facing the magnet plate and washers.

Trial fit the tubing through the ½" hole drilled in the stator base plate. It will fit up flush with the resin so that the stator clamp plate will fit over.



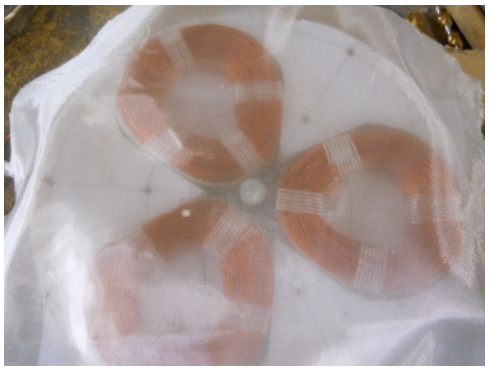


Liberally coat the bearing tube with wax so it can be tapped out after the resin pour. Fill the bearing tube with wax so resin doesn't enetr. Later you can heat the tube and melt the wax out. Make sure the AC wires are sealed with wax so resin doesn't drip out.



Cut a circle of fiberglass cloth to fit over the stator. Cut a slit crosswise and pack down around the bearing tube so it can more easily be tapped out. Cut a piece of heavy plastic painters drop cloth to use as a mold

release. Set these aside for now.



Mix up 5 oz of resin per directions. Its a good idea to wear gloves when working with resin. Preparing your work area with drop cloth will save you a lot of cleanup troubles.

Pour over the coils saturating them first and letting the excess run over and around.

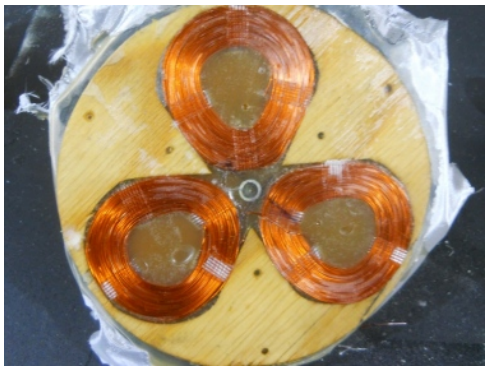
Lay the fiberglass cloth on and using a small brush saturate the cloth pushing down and around the coils.

Lay a piece of polyethylene plastic on top (painter's drop cloth, kitchen trash bag etc..) on top. Put the stator press on and clamp down tight.
In the picture below the stator mold is shown clamped.

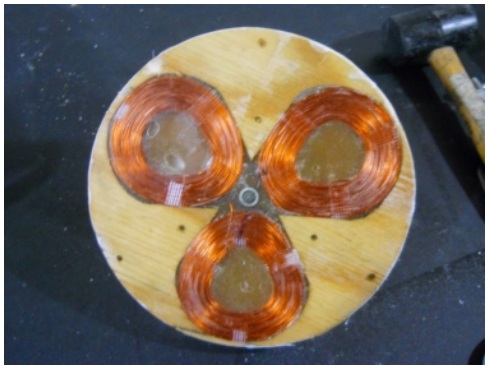
Make sure during the cure period the stator mold is on a level surface. Allow to cure for at least 4 hours. Go get a beer.

Step 14.
Remove the stator press piece and inspect. The resin may not be perfectly flush with the top and that's Ok for keeping the stator cool. None of the coil wires should be raised or loose. If needed you can reapply another batch.

Add enough resin to be right at the top and using a new piece of plastic clamp the press piece down again and let cure.



Out of the mold, 5 Oz was perfect!



Remove the flash with some shears and a sander. **Caution:** Wear a respirator when sanding fiberglass. **Really!**

Step 15.
Mix up another 2-3 oz of resin and pour into the magnet plate. Avoid getting any resin on tops of magnets. The purpose is to seal the steel, and keep the magnets from sliding. Do not use fiberglass cloth. The scratched surface will keep the resin bonded.

Step 16.
When the stator is completely cured, tap the bearing tube out from the bolt head end underneath. Re-drill out the shaft hole to fit the bearing tube more loosely so that it can be trued in a later step. Tap the bearing tube back in – it should still be a good fit.

Step 17.
You can sand the outside of the stator now and finish it as you want with paint. Latex holds up better to outdoor exposure on wood. Avoid sanding the stator surface as you could sand through and damage the coils. Do not paint the stator coil surface. It is handy to be able to inspect the coils.

Step 18.
Fit the 1.5" conduit coupler and scribe a mark with it centered. Run a bead of silicone sealant around to bed in the coupler. This will need to form a seal so when you pour resin later it doesn't flow out. So don't rush the curing process for the silicone.

Using the threaded end of the shaft, install a nut, and large 3/8" fender washer. Place another fender

washer between the paint can lid and plywood to take up the space. Push through plywood rotor. Install another fender washer, lock washer and nut, but don't tighten fully. Lay this assembly on its back with the shaft facing up.

Step 20.
Fit the stator down over the rotor and shaft. The object here is to get these two parts parallel. Play with these parts by turning the stator on the magnet plate. If the bearing tube and shaft are close to true there should be no big gaps as you turn. If while turning, the shaft and tube are forced to wobble you will need to track down the problem. It is usually a hole drilled crooked. If you need to slightly oversize the hole in the stator to prevent the wobble that is Ok.
Make sure the two are parallel at any point in rotation and then fully tighten the rotor shaft. Check alignment again and if it is good, clamp the stator to the rotor so that alignment is maintained for the next step.

Step 21.
Cut some small scraps of fiberglass cloth and pack down in to the coupler and around the screws and bearing.
Remove the two ¼-28 set screws from the coupler nearest the stator and replace with 3/4" long ¼-28 screws so the coupler wont twist.

Mix up 2 oz of resin and carefully pour in. Do not fill past the level of the mid line on the coupler. Allow to cure thoroughly.

Step 22.
Check the fit of the rotor to the stator and re-tighten the shaft nuts. Add as many washers as needed to adjust air-gap. 1/16" is a safe gap and still effective.

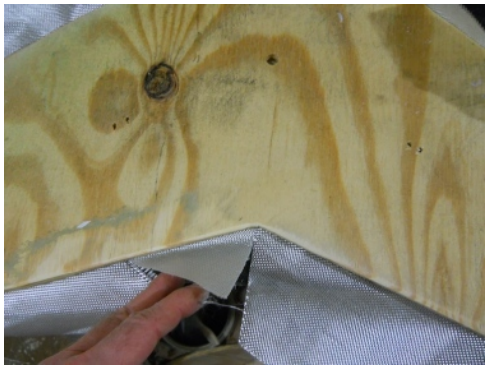
Step 23.
Remove the turbine rotor. Drill 1/8" pilot holes through magnet plate through plywood rotor. Install three ½" long #6 wood screws from top of rotor. These will bite into the paint lid and resin enough to prevent the rotor from turning.
Check again for parallel running.

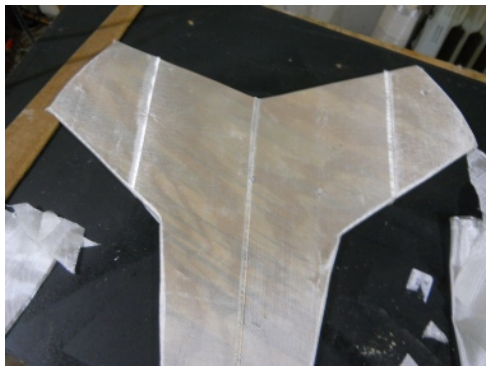
Step 24.
Epoxy in the oil seal (bolt head to the bearing tube). Put some epoxy on, press the bolt head in and then turn over the bearing tube so epoxy doesn't run into the bearing area. Allow to cure and before running, fill tube with enough light oil to ensure low friction and long service.

Fiber Glassing the Turbine

Step 1. Cut fiberglass material to fit over the top of the rotor and enough to drape and fit under.
Spray the rotor with a mist of 3M super 77 contact adhesive and start by laying the fiberglass on the rotor immediately. This will allow some repositioning. Pull out wrinkles and then pull down over edges.

Spray the bottom of the rotor and pull the material over and trim in line with the rotor arms. Overlaps should be avoided. Trim along a straight line. Trim any loose bits until it all looks neat.





Step 2.
Make slit cuts where the spar, shaft and bracing holes are in the rotor.

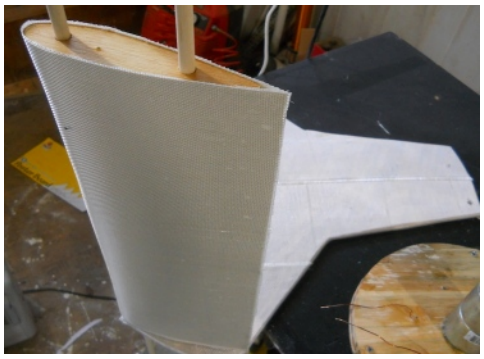
Assemble the turbine by inserting two dowels through the turbine rotor plate. Slide the blade sections on. Trim the blades as needed to have the blades meet the rotor flush.

Put a couple turns of masking tape on the dowel around where it meets the rib former.

Turn the turbine over and press the blade down until it meets the rotor flush and put a couple turns of masking tape around the dowel. This will keep the blades in place while you recheck the squareness of the turbine.

Repeat for each blade until all are installed.

One way to keep things square is by placing the turbine on a drop cloth on the floor and square the top blades. The weight of the turbine will keep things straight while you resin the top sections. Let dry and turn over and resin.



Important - keep the turbine square by measuring blade to blade, use a T square between blade and rotor.

Step 3. Mix up 8oz of resin per side. Paint on fiberglass resin with a brush one side at a time. Lift each blade just enough to work a little resin under the blade to rotor joint. Then do the blades and rotor. When dry, flip over and do the other side. Make sure as the resin is being applied the turbine remains square. Once the resin cures it will be difficult to straighten things.

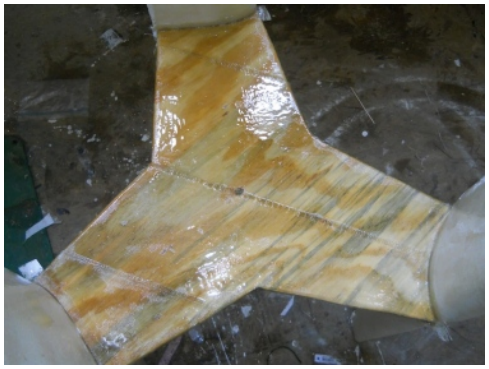
Add 1" strips as gussets along blade to rotor joint and wet in with your brush.

After the first coat dries for a couple hours, use a high speed rotary sander with 100 grit and sand down high spots and loose bits.
Caution: Wear a respirator for this step.

Apply a second coat of 8 oz. for the whole turbine. Go over any places that weren't fully saturated on the first coat and then smooth on a thin coat overall. Allow to dry overnight.

Finishing

Step 1.
Once the resin is cured, you can finish sand any high spots or drips using 200 grit sandpaper and a rotary sander.



To paint fiberglass you first need to clean it. A good washing with soapy water, clean water rinse and drying.

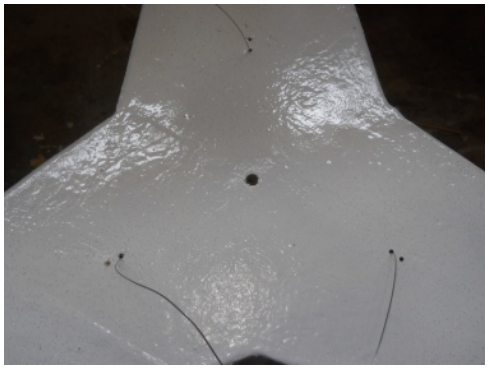
We used a hammered white finish and it took only two light coats. A mirror smooth finish is more a matter of preference than performance.

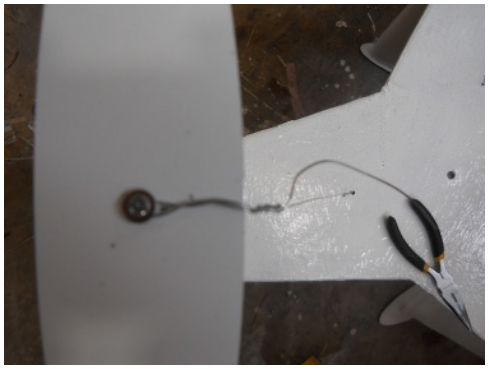
Some texture to the blades is Ok. Perfection is more a matter of how much time you want to spend. Two thin coats is enough to work.

Step 2.
Run bracing wires from blade tips to rotor. Use the heaviest wire you can stand. Heavy wire rated for at least 50 Lbs or more - Stainless or galvanized – double up the wire if needed. This is the part that gets a lot of stress, and if these wires fail the blade will snap off in high winds. (it happens and isn't that hard to fix)

These wires should be tight, however not so tight as to pull blades in. Check with a square. Use the ¾" long #8 wood screws with a washer to secure the bracing wire to the blade tips. Attach bracing wires

1/3 back from leading edge and down to predrilled holes in the rotor.





Step 6. You can cut blade tips from thin plywood or plastic. Use silicone caulk and ¾" long #8 wood screws with washers to attach onto blade ends.

These tip should overhang at least ½" but not more than ¾". Any overhang at the leading edge causes drag. The object is to prevent spill off the blade ends and direct the power back. Blade tips increase total power by 15%.
For best performance – streamline the blade tips so the edges are feathered instead of square.

Step 7. Balancing the turbine is easy. Place the turbine onto the stator and hold horizontally. Turn 45 degrees at a time and look for a heavy side. If one side is heavy make a mark opposite and attach a few washers with a screw to an outermost edge. Avoid adding weight to a blade tip. Keep any added weight on the rotor plate.

Wiring

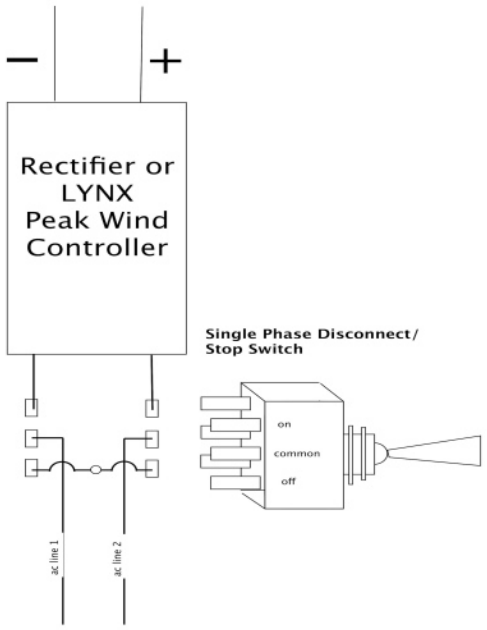
Using a heavy gauge two wire conductor, strip off 1.5" and solder the tips of the copper. (Heavy speaker wire or lamp cord, or extension cord will all work.)
Attach these to the underside of the stator by looping around and then tightening the nut. These two wires go to the AC connections on the bridge rectifier.

Caution: The worst thing is to have these connections loose. If while the turbine is running in high winds any wire should come loose there is no way to control the turbine.

If you have a long run of wire from your turbine it is better to run the AC the long distance because you have less loss of power in AC runs.

Attach a red wire to the positive output and a black wire to the negative output of the bridge rectifier. Use good connectors and crimping technique to make sure things don't eventually come loose or short out.
The red wire can now connect to the battery positive and the black wire to the battery negative.

It is a good idea to place a stop switch in the circuit. Or at least understand how to short out the AC leads with a jumper wire of a large gauge wire. This is important should you need to stop the turbine in storm winds or for servicing.



Do not place a fuse in line. If for some reason the fuse would blow the turbine would be uncontrolled.

This turbine is designed for direct charging and is unlikely to ever overcharge a 12 volt battery.

The design of the alternator together with the Turbine will produce very spikey AC. If you check the voltage with a multimeter you may only see 7 volts AC, but the spikes may actually be more than 12 volts. As rpm increases so do these spikes and so does the frequency. Combined these create more and more power output as rpm and winds increase. Charging should occur in 9 mph winds and above. There isn't much power in 8 mph and below.

RPM should be about 100 with a 5-6 mph wind and race up to 500-800 rpm in high winds.

Attaching to a pole

You can buy 1.5" EMT (electrical mechanical tube) for about $10 for a ten foot length. This can be erected in a number of ways. A satellite dish mount also is setup for 1.5" pipe and could be used as a mount. Cut the tubing as needed.

Caution: However you decide to mount, consider just how much force might be exerted to the foundation. You don't want to cause property damage or injury by using poor judgement when installing the pole. Think of this as you would a basketball hoop near your driveway. In high winds you don't want that hoop and backboard to come down on your car. This turbine presents about the same profile in high winds.

Step 1. It is **vitally important** that the pole coupler is secured properly to the pole. This isn't like a horizontal axis turbine that just sits up there. The twisting force is strong enough to break anything smaller than a ¼" bolt. The power can be as much as 3/4 hp.

After you determine where and how you will erect the turbine, install the pole coupler/stator to the pole. Tighten the set-screws firmly. **Important:** Now loosen them and remove the coupler. Drill out a ¼" hole where you see the mark from the lower screw on the pipe. Reinstall the coupler/stator and line up the screws so that the lower screw sinks well into the hole you drilled. The top screw should be tightened very tight. You want to make sure there is no chance the whole turbine can turn on the pole in high winds. If it does, the wiring will quickly be ripped out and you will have no control of the turbine.

Make sure the bottom of the pole is also securely tight and unable to turn in its foundation. A through bolt is a good way to prevent turning.

This turbine does not need to be mounted as high as a HAWT. Just make sure it is safely above anyone's reach and clear of property.

When erecting the turbine, short out the two output wires by twisting them together. This will prevent the turbine from starting up while you secure the pole. Have all the wiring setup at the charging area. Now, install the turbine rotor to the stator.

Important: Choose a calm non-windy day to put the turbine up.

Put the turbine up. Untwist the output wires and make your connections.

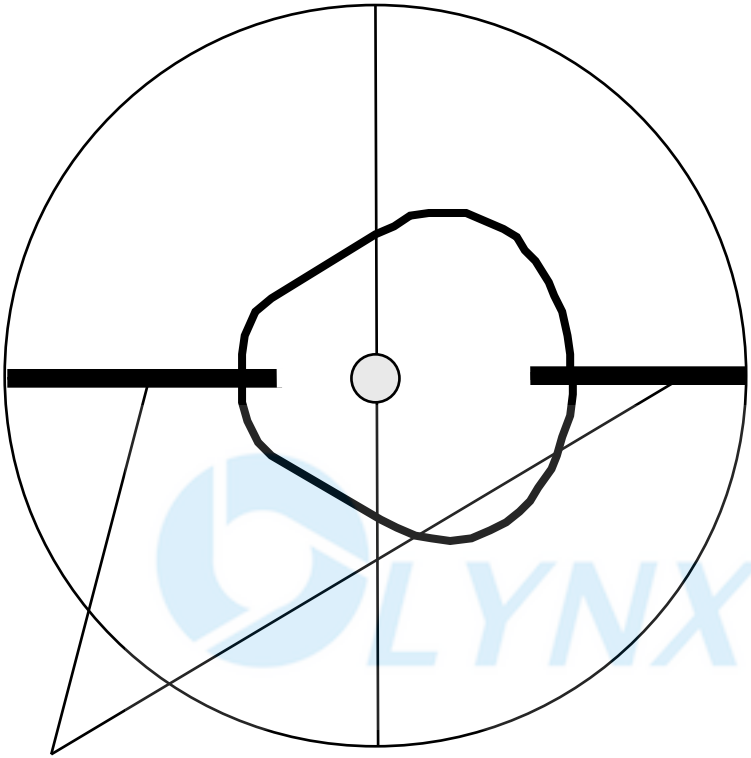
You can monitor charging by putting an amp meter in line with the positive lead to the battery, or monitor the voltage on the battery with a volt-meter.

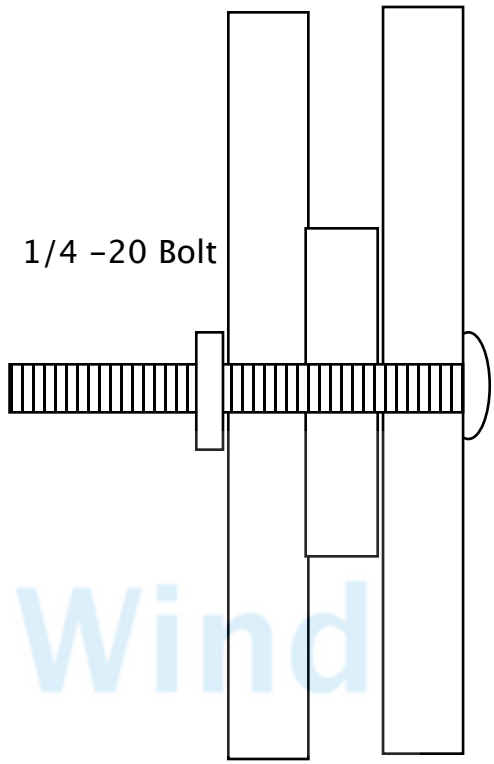
If you have gotten this far – congratulations! It is quite an accomplishment.

If you have any questions or thoughts on improvements please share at www.lynxwind.com/forum

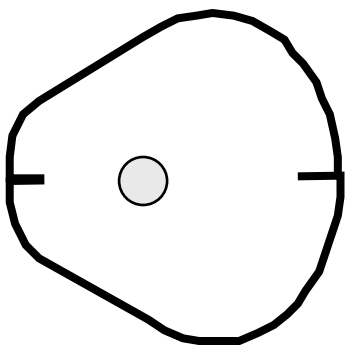
And please post pictures of your project.

Cut two 4" D disks from 3/8" plywood



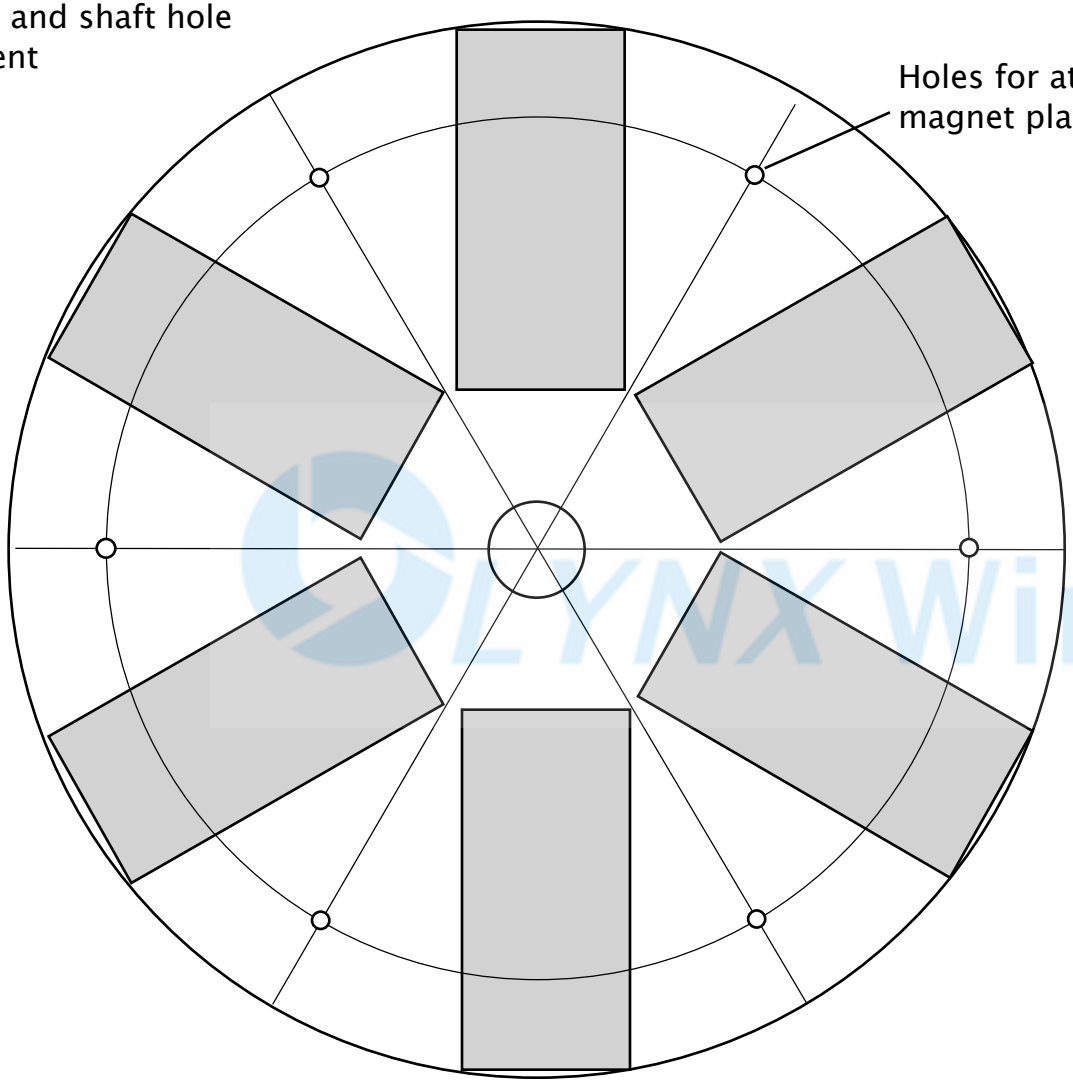


Cut slots in disks and inner form wide enough for magnet

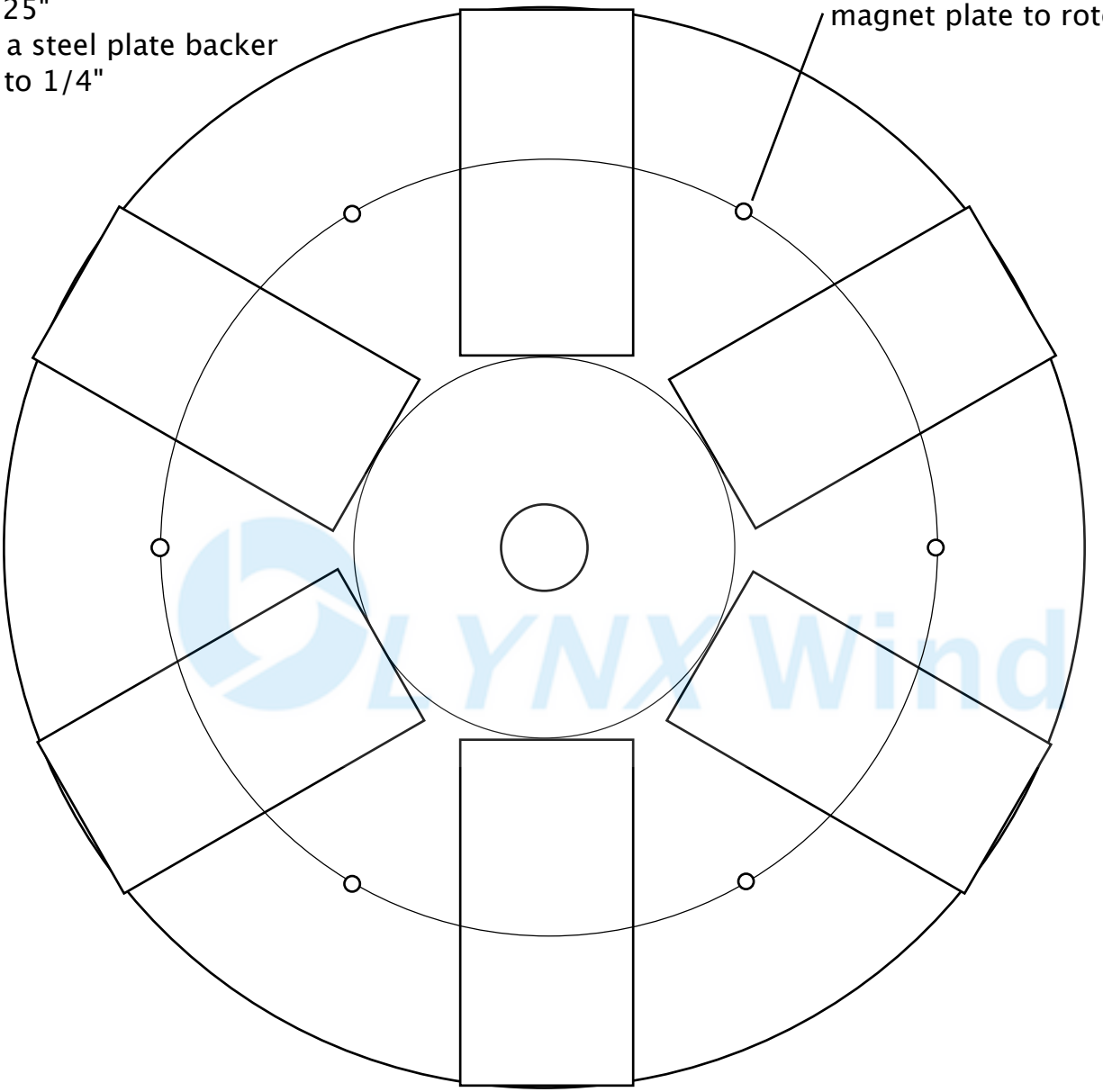


Cut one inner coil form

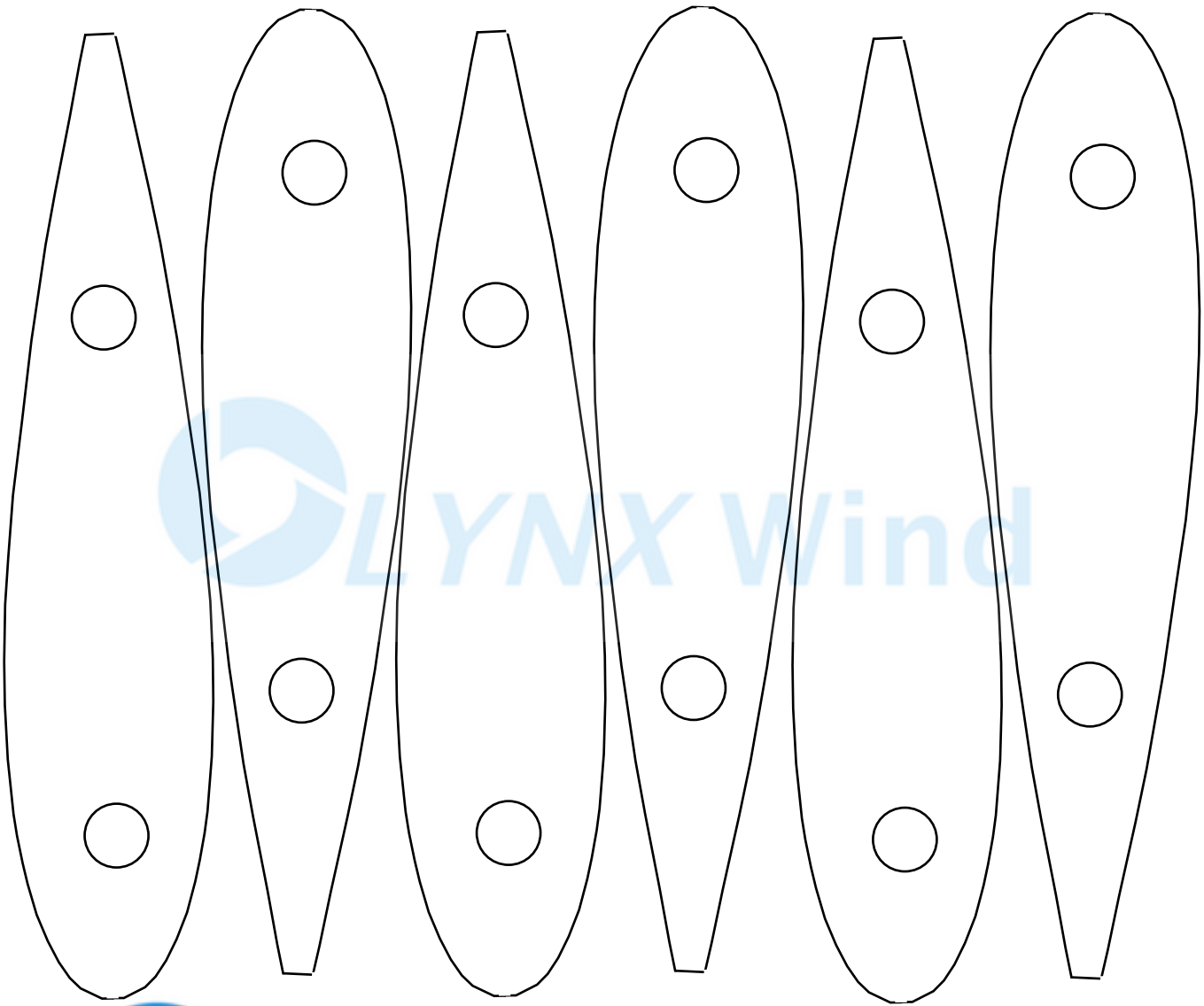
Inside can lid dimension
magnet and shaft hole
alignment

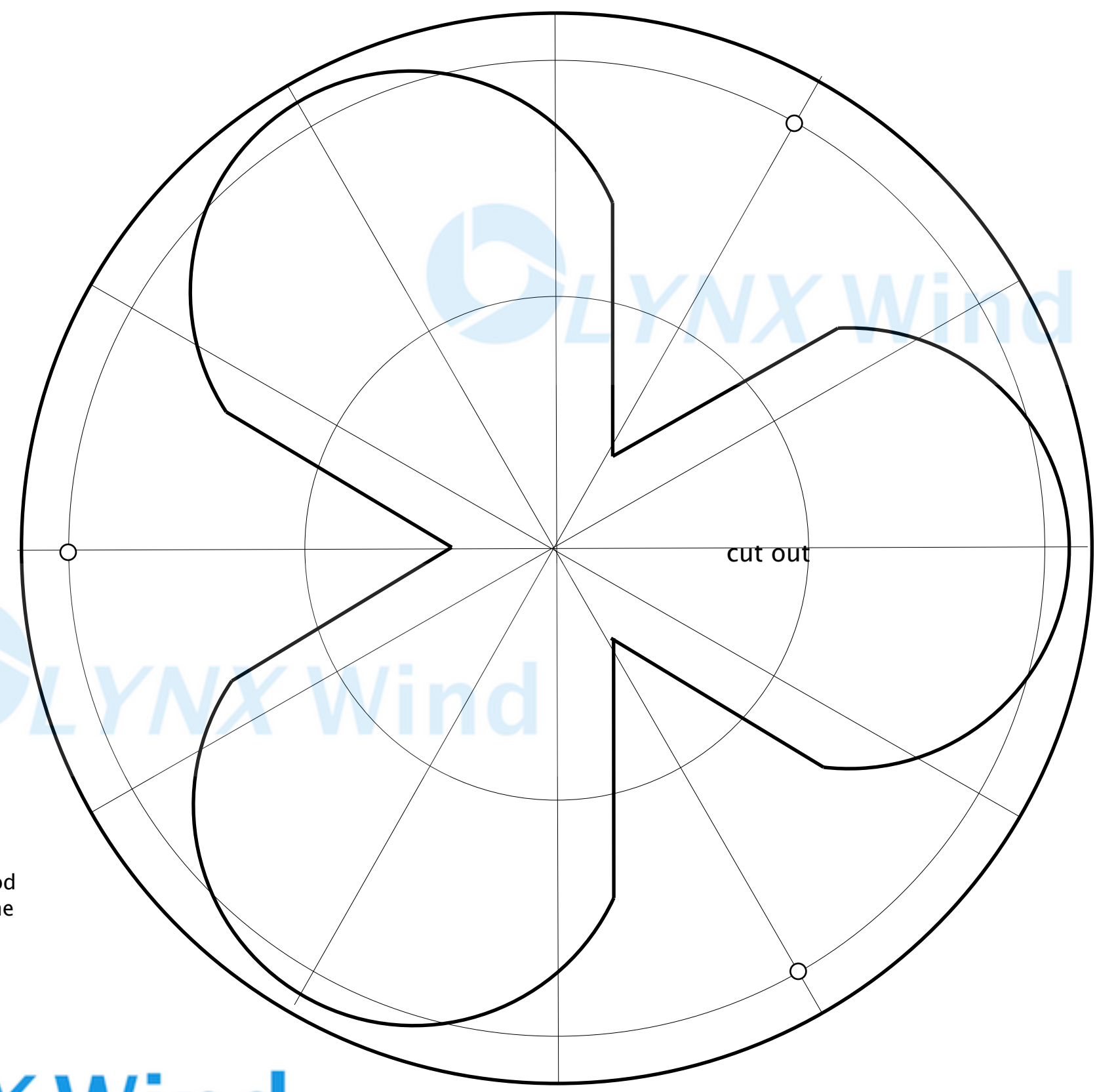


Option - higher power
Neodymium N42 magnets
2" x 1" x .25"
Mount on a steel plate backer
10 gauge to 1/4"



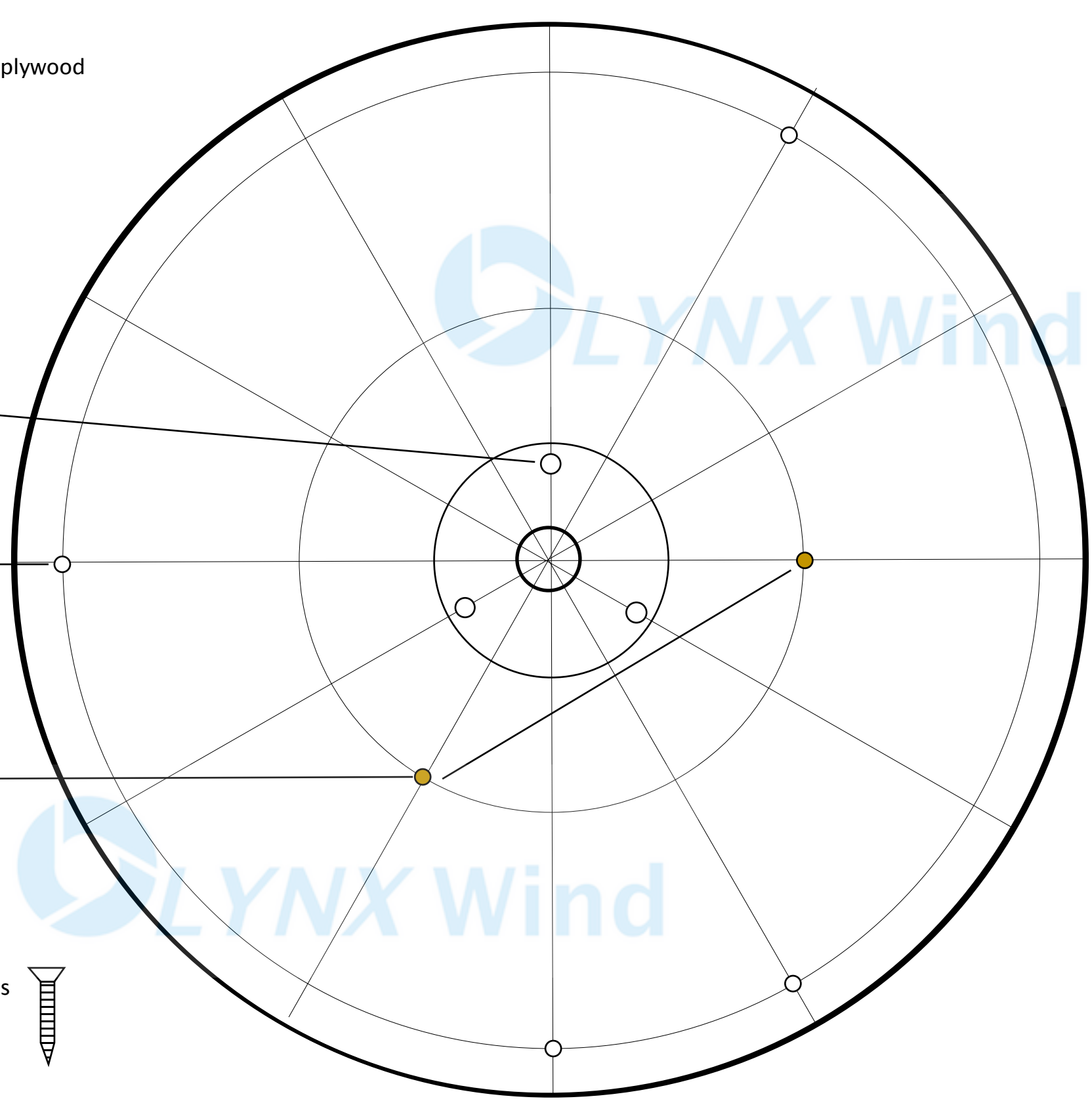
Rib formers (12 required)
Rough cut from double stack of 3/8" plywood,
sand until black line disappears and uniform





Stator - Cut one from 3/8" plywood drill a pilot hole and jig saw out the coil retainers.

Stator - Cut two pieces from 3/8" plywood



Use a polyethylene sheet plastic for mold release (painter's drop cloth or kitchen trash bag...)