

DIY Wind Turbines



Definitions

Volts - is the change in electric potential (meaning potential energy per unit charge) between two positions. It can be thought of like water pressure.

Watts – this is the power that is produced by amps (which is the current) multiplied by the voltage.

Amps – The amount of electricity that is being transferred through the wire. Amps are commonly known as current.

Direct Current (DC) – It is called direct current simply because it keeps a specific route. DC current can be stored in a battery which is extremely important when generating your own energy.

Alternating Current (AC) – AC current constantly changes directions. AC is what most of us are accustomed to and is the most common form of electricity. DC can be converted into AC so that generated energy can be used practically with daily appliances.

Wind Turbine

There is a not a ton of parts that you need in order to build your own wind turbine. The following are the parts that you will need.

- ▶ DC Motor
- ▶ Motor Hub
- ▶ Propeller blades
- ▶ Post for mounting
- ▶ Housing or platform for DC motor
- ▶ Tail
- ▶ Battery and Desulfator
- ▶ Inverter
- ▶ Wiring

We will look at ways to acquire some of these and also ways to build some of these.

DC MOTOR

It is extremely important to have the right motor as this is what will produce your power. Below is a picture of a DC motor.



Voltage and relative RPMs are determining factors when choosing a motor. You can find great deals on motors at ebay.com. All the motors that I buy and that I have recommended come from ebay.

Here is what you are looking for.

First, I would go with the brand Ametek. More specifically, a Ametek Permanent Magnet DC Motor. You want something with high voltage and low RPMs. Try and find a motor between 30-90 volts and below 425 RPMs at 12 volts.

Motor Hub

A motor hub attaches to the shaft of the motor. You then attach the blades to the hub. There are many ways to develop or create your own hub but it is advisable to pick one up. I recommend looking on ebay for a reasonably priced hub.



This is a pic of a hub found on ebay.

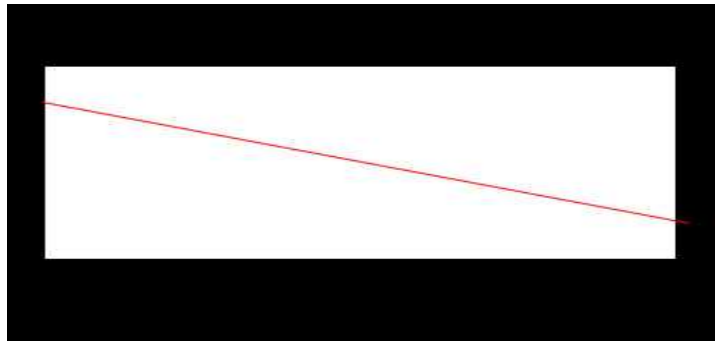
Blades

Blades can either be purchased or made. We will look at both methods.

You can make blades using PVC tubing. We want to choose a diameter that is large enough to house our motor as we will be using it for that also.

You will want to use either a 6" or 8" pipe. You will want a length between 24"-28". Cut the tubing lengthwise so that you end up with a pair of half tubes that are equal in length.

Each half will make 2 blades.



Below is a guideline depending on the diameter of the pipe.

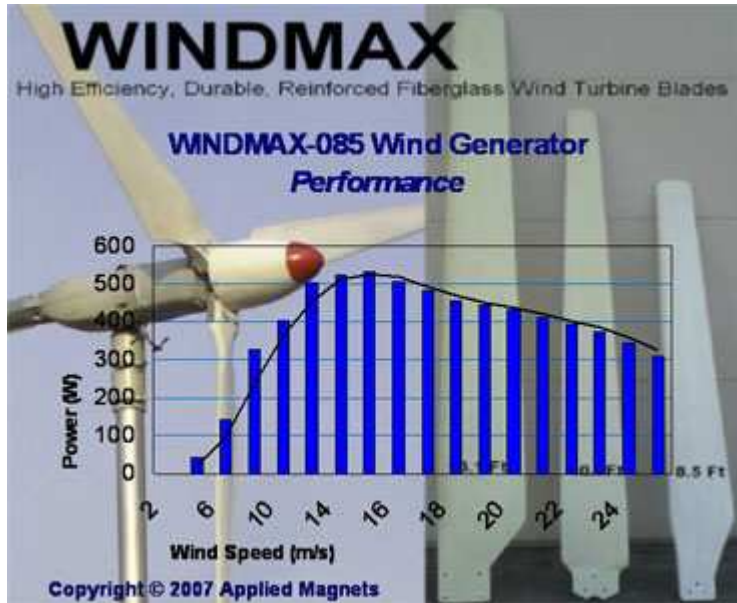
Tube size	Large end	small end
6 inch	6 inches	4 inches
8 inch	6.5 inches	4.5 inches

You will want to use 1"-2" flat steel that is 12" in length and ¼"- ½" thick to attach your blades to the hub.

You will also want to paint these pipes to make sure they can hold up in the outside conditions. You will want to use paint with a UV inhibitor.

The paint should include the ingredient Titanium Dioxide.

You can also buy blades on ebay. Many times you can find a set of blades that includes the hub. The prices on these are relatively low. Here are a couple of examples of what you can expect to find.



Motor Housing

You will need to create a housing unit for your motor in order to protect it against harsh weather conditions. There are many different ways to accomplish this but the simplest is also one of the most effective.

You use PVC pipe. If you made your own blades, you can use the same pipe that you used there. 6" pipe will typically hold most DC motors. You will need to make sure that the motor is secure within the pipe to avoid it moving around.

Before you seal the ends of the enclosure you need to keep a few things in mind. The shaft of the motor will need to come through on the front end. You will need to remember that all the wiring will need to exit the enclosure at some point.

You will also need a mounting bracket attached to the enclosure. This bracket will need to have the ability to swivel and point into the wind. Once this bracket is mounted to the enclosure, it is a good idea to weld a small pipe coming down from the bracket to attach to our main pole.

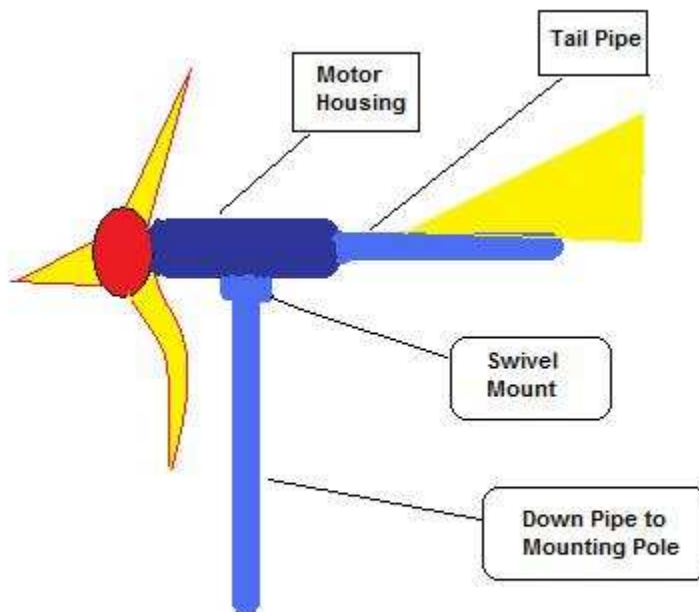
A very simple solution for the swivel bracket is to use an old caster from an office chair. The wheel is removed and you can cut it down to fit our assembly.

Tail

The tail can be made from a lot of different materials but the easiest is to use PVC pipe. You will want to use something that is smaller diameter than what you used for your body. (where the motor is mounted). 3" pipe works well. You want 2' - 3' of pipe.

You will notch one end and insert the fin. The other end will be fastened to the motor housing unit. You can do this by creating a threaded end and drilling a hole into the end piece of the housing.

Below is a simple diagram of how it should all fit together.



Tower for Wind Turbine

There are a lot of options for a tower for your DIY wind turbine. One popular option is to use an old TV tower. You can also use a metal straight post. Either option should be anchored.

Batteries

WARNING: Batteries can be very dangerous and every precaution should be taken when working with them. If you are ever in doubt, you should consult a professional.

First, you need to use a deep cycle battery. Batteries can be very expensive if bought new. However, there are many ways that you can acquire batteries.

The two most popular methods of finding free deep cycle batteries are at golf courses and industrial plants. Golf cart batteries are deep cycle

and are perfect for use. Fork lift batteries are also deep cycle and are great. Fork lift batteries can last up to 20 years but most industrial plants replace them long before that.

You can also find batteries at the dump or a junk yard. Be careful at either and ensure that you are getting a deep cycle battery.

Most batteries that are "dead" really are not dead. I am not going to go into 5 pages of technical knowledge about how a battery works and how they can be brought back to life. If you want the info, you can find it on the internet with a quick search.

You can bring these batteries back to life with a simple device known as a Desulfator. You can find them for very reasonable prices on ebay. These can save you a ton of money on batteries for this project and many others.

Here is an example.



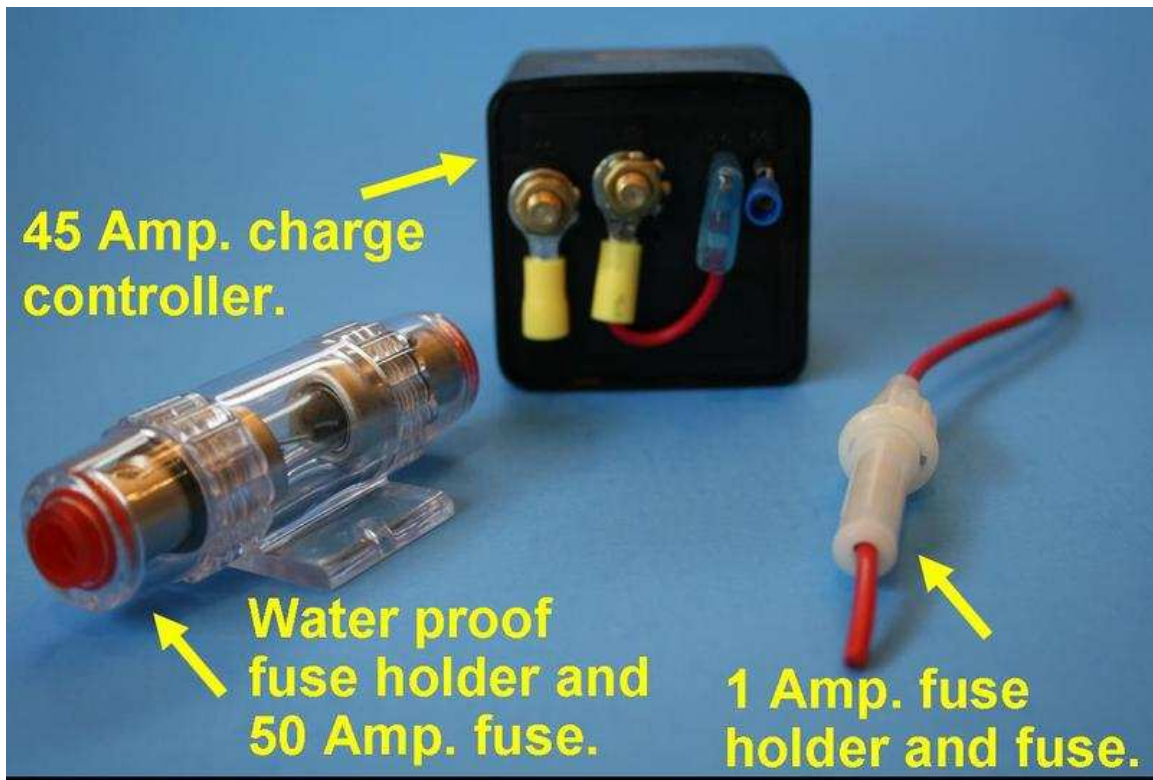
When hooking up your battery, you want to make sure that you use wire that will handle outside conditions. The size of the wire is also important. #12 copper wire will typically work for your system.

Charge Controller

A charge controller monitors the battery and either sends the energy to the battery or diverts it when the battery is already fully charged. If you overcharge a battery, it can destroy it.

You will set your charge controller to turn on when the battery charge drops below a certain point and to turn off when it reaches a certain level. 11.7 and 14.3 works the best for these levels.

Once again, you can pick these up on ebay. Here is an example of a kit that will work great.



Inverter

You will use a voltage inverter to convert the stored DC energy to AC. You will then be able to power day to day appliances. These are available many places online but I typically go through ebay. Here is an example of an inverter.



Hook Up

The hook up is as follows.

Wind Turbine – Charge controller – Battery – Inverter – appliance

Conclusion

That's it. You have now constructed your own wind turbine and should be generating power. Please be safe. There are a lot of potential accidents when doing and DIY project. You can use this as a stepping stone to building bigger wind turbines and venturing into solar panel constructions.