

Brakedrum alternator update (updated April 2002)

I am building up this page on the web to help people who are following my brakedrum windmill plans. For details of how to obtain these plans see my [books page](#). I am always willing to help readers who have problems, or who wish to develop new variations on the design based on different sizes of parts or different voltages. Send me an e-mail with full details to hugh.piggott@enterprise.net

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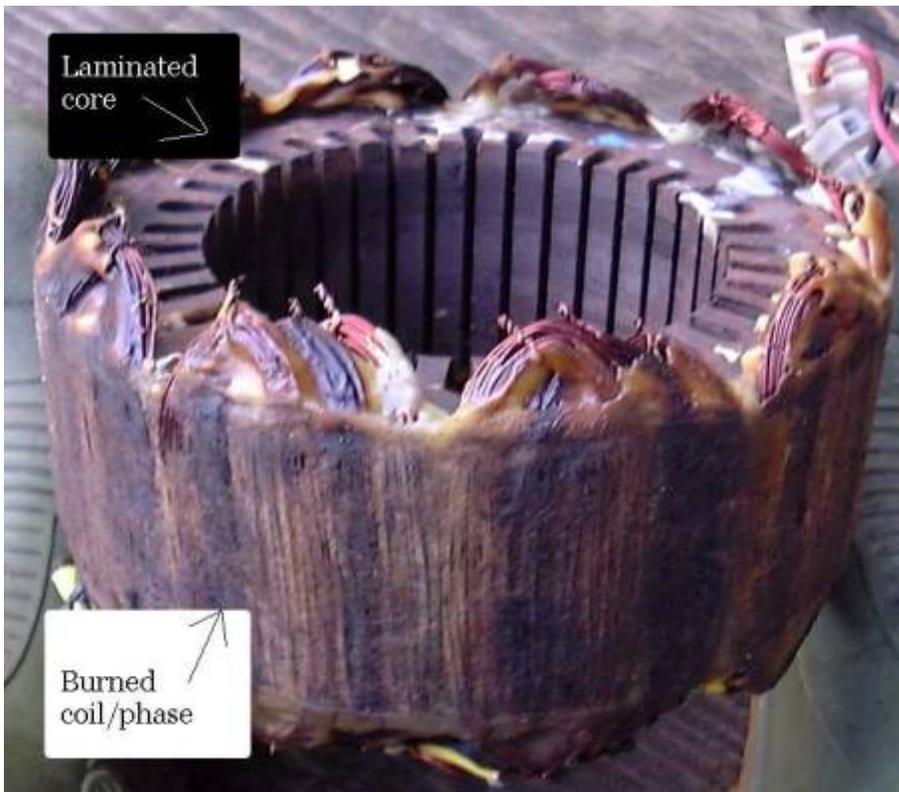
To clarify the differences between the solaced european and n american version of the design see [this page](#)

Magnet supplies - some links on [this page](#). Magnets for the north american version (3x2x1" ferrite) are now available from wondermagnet.com for \$5 each.

It has to be said that building a wind turbine is not like mowing the lawn, it is rather a challenge, and although my books will be an enormous help, they cannot make it into an exercise like assembling a kitchen unit from a flat pack. Not yet anyway. Maybe one day...

Problems seem to centre on the production of the stator. I have to agree that this is the hardest part to make. Here below are two pictures of the stator, for a start. It's an old one and has suffered some overloading on one phase due to a short circuit. This helps to pick out the shape of the phase which is burned - the middle coil in each heap.

As you can see, the air gap between the surface of the laminated core and the surface of the magnets is filled up with copper wires. This is how we extract the maximum power. At the ends (beyond the ends of the core), the coils overlap and are too thick to fit in the airgap - but this is not a problem because they are not in the air gap. The ends can be folded down hard if necessary, to make them fit the available space, but be careful not to damage the insulation.



A lot of people have recently started to ask how to get hold of laminated cores like this. Do not buy them as new or secondhand items! They are available for next to nothing as **scrap metal** from yards which specialise in dismantling and recycling old electrical and other goods to sell off the metals. Here in the UK they are called scrap dealers or non-ferrous metal dealers.

There is much more about the laminations for the n american version in an [e-mail message](#) below. Take care when selecting a stack of lams that you **avoid or remove any fastenings or welds** which might short circuit the laminations together near or at the outer edge. These will cause high 'eddy currents' to flow which will waste power and slow the machine right down.

Fitting the stator into the space between the magnets is another cause of grief.

It is very important indeed that the coils lie flat. The former which clamps them in place is a critical tool, and it has to be made very carefully. The surface of the former has to be absolutely true, without hollows which would cause high spots. An easier way to make the mould (I am indebted to [Bob Budd](#) for this tip) is to start with a layer of card on the core to represent the coils. Then lay a thin piece of sheet metal over the card so it has the exact right shape. Then place a crude wooden former behind the sheet metal and fill the space between former and metal with resin - epoxy, or even body-filler polyester resin will do. This procedure will allow you to make a very accurate mould without painstaking woodcarving.

Before gluing the magnets into the brakedrum, first check that the stator will fit in the available space between the magnets. Some magnets can be placed within the drum 'loosely' for the purpose of this test. You want to have 1-2 millimetres (40-80 thousandths of an inch) all around the stator for a comfortable clearance. If the fit is too tight, then I suggest you skim the brakedrum inner bore on a lathe (or have this done in an automotive workshop - it is a normal job). This will give you more space to play with.

Here is an excerpt from an e-mail correspondence about how to mount the stator securely and centrally:-

>After purchasing and reading the subject book, I find that there is a
>lack of information on how you mounted the stator (laminated core) to
>the axle assembly. This seems to be an important procedure missing from
>the "Putting it All Together" section of the book. Can you supply any
>details on this?

Happily. Last week I had a similar enquiry and was shocked to see how little help I give on the subject in the plans. Before that, no one had pointed it out, even though many successful alternators have been built. The plans have been on sale for seven years and I frequently update them to respond to comments such as yours.

> Without these details, the subject book title is
>misleading because incomplete plans are really not plans at all. They
>become nothing more than a series of "ain't this cute" ideas.

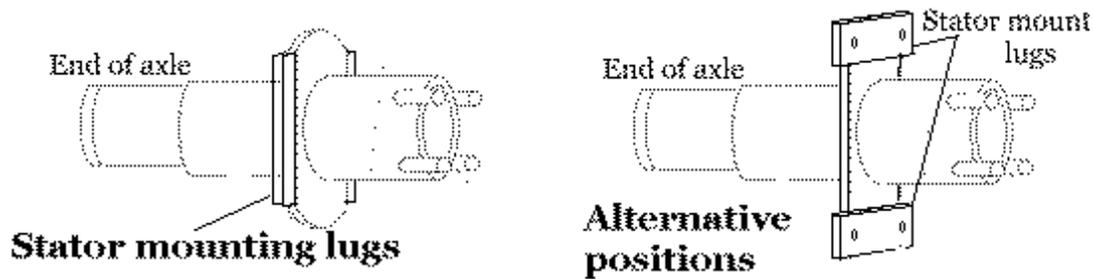
In reality is never possible to get the same component parts as I have used. Everyone has different sized parts from different sources. So it is essential to be flexible and find your own solutions for details. I assume this is what others have done. But now you point it out I can do much better by explaining it.

Begin by measuring the size and spacing of the slots in the stator, which used to carry the coils. Find a size of bolt (or threaded rod) which fits snugly into the bottom of a slot. Place four such bolts through four slots. wedge the stator inside the drum, while the drum is on its bearings on the axle. Measure the size and shape of lug needed to hold the end of the each bolt.

Bolts through the slots, into the holes in the lugs. Choose bolts (or long pieces of threaded rod) which fit snugly and carefully position the holes so that the bolts are in the bottoms of the slots. Centre the stator carefully and then weld the lugs in place on the back plate flange.

The shape of the lugs and their position will depend on the shape of the brake system. If there is no flange in the right place to weld the lugs onto then make up tabs from strips of 1/4 inch steel flat bar. Drill holes at the outer end of each strip.

Let me know if this is not clear :-)



A message about the details of the spreadsheet formulae

To: Bruce Gebbeken <ideneh@yahoo.com>, awea-wind-home@yahoogroups.com
From: hugh piggott <hugh.piggott@enterprise.net>
Date: Fri, 9 Feb 2001 14:07:49 +0000
Subject: Re: [a-w-h] Those windmill formulas...

At 2:04 pm -0800 8/2/01, Bruce Gebbeken wrote:

I purchased from R.A.M. some time ago the 1999 edition of "The Brakedrum Windmill" original design by Hugh Piggott. Those folks included Hugh's Mathematical Model of the Brakedrum Alternator on the back page.

the spreadsheet is also available on their technical page at http://www.windmill.on.ca/tech_.htm

Now I have some questions on the formulas that I hope someone could help this old goat out on, if it is not too much trouble;

Feedback is always welcome, so I can improve what's on offer.

1). *Total power generated, in watts, your basic $I \cdot R$.*

mistake. $I \cdot R$ is volt drop. $V \cdot I$ is power.

The formula shows $P = V_{BAT} \cdot I$, shouldn't this be $P = V_{ALT} \cdot I$?

No. V_{BAT} is the actual voltage when the battery is connected. V_{ALT} is the 'open circuit voltage' which you only see when disconnected.

2). *The determination on wire diameter, in mm. Does this formula work outside of the brakedrum alternator,*

NO see, my 'assumptions':

1. I assume that the stator winding is 2.5mm thick, in a total gap of around 4mm.

This determines the available space for the wire, and hence the wire size you can use.

and what does "0.7" and "0.5" represent anyway? Are they constants?

yes. $DWIRE = 0.7 * (W/T)^{0.5}$

All these formulae are rules of thumb using constants. 0.7 is a constant which works for this situation. $(W/T)^{0.5}$ is computer-speak for 'square root of' W/T .

3). Hugh assumes that the alternator is wound Star. How are the formulas affected when winding Delta?

if the coils are re-connect delta then the output voltage VALT will be reduced by a factor of 0.58 (=1/root3). Internal resistance R is reduced by a factor of 1/3.

$$VALT = N^2 * L * W * T * RPM / 260000000$$

$$R = (L+W) * N * T^2 / W / 26000$$

But star connection is marginally more efficient.

4). Are the alternator formulas affected by the type of magnets used?

Yes this assumes the use of ferrite magnets. The magnets need to be 20-25mm thick, and at least 32 mm wide.

My basic electronic theory says yes, however I am getting older and duller. What formula correction would be used for, say, Ceramic vs. Neodymium?

My researches have not reached the point where I can make a confident statement about that. Neos ought to give about 3 times the flux, but there are many factors.

5). When using these formulas to modify the alternator, at what speed formula-wise should I consider physically cutting out the alternator to keep from melting it into a blob at the base of the tower? This of course means electrically.

You need to look at the internal LOSS = $I^2 * RI$ and consider whether the temperature rise will be excessive. The answer will depend on how well cooled the stator is. There is no accurate formula which can tell you that a particular size of wire can carry a particular current in a winding.

If you keep the power output down, then the alternator will last for ever. If you thrash it, then the

windings will fall off the laminations after a few years.

6). Now allow this old man one last question. Without going out to buy a Rosenberg (\$90), or re-purchasing the more complete "Direct from Hugh Version" of the Brakedrum Alternator with the enclosed formuli, is there a place to download updated versions of these and other alternator formulas? They seem to be no longer on the PicoTurbine web site as mentioned in my book.

I am always <mailto:hugh.piggott@enterprise.net> here to answer questions, and I endeavour to improve the design where I can. I have started a page a <http://www.scoraigwind.co.uk/brakeupdate> where I try to put helpful stuff. This message may well find its way onto that page later.

I did this design almost eight years ago now and of course I have had plenty of brand new ideas since then. The old brakedrum idea is not the be-all and end-all for me, by any means.

--

Hugh

Scoraig, Scotland

<http://www.scoraigwind.co.uk>

To: "James L. Jacobs" <grannie613@juno.com>, a-wea-wind-home@yahoogroups.com
From: hugh piggott <hugh.piggott@enterprise.net>
Date: Mon, 19 Feb 2001 18:00:48 +0000
Subject: Re: [a-w-h] Brakedrum alternator

At 5:41 am -0800 19/2/01, James L. Jacobs wrote:

>After buying Hugh Piggott's "Brakedrum Windmill Plans" a week ago I
>decided to visit the local pull-it-yourself auto junkyard to check
>availability and price of the Ford 3/4 ton rear end. I was dismayed at
>the price: Ecology recycling in San Diego, Calif. wants \$175 !

You could get a lower price if the differential gearbox is beyond repair.

> The shape

>on these brakedrum varies significantly from the drawings; the hub
>containing the bearing extends ~4 inches out from the flat area on the
>drum where the wheel lug nuts are located. This feature will make it
>difficult to attach the prop assembly.

It is possible to use either of two 'fixes' for this problem. Either

bolt the rotor direct onto the end of the bearing hub, or build it around the hub. Both of these have been done successfully. If the rotor is very large then it may not sit comfortably on the end of the hub and a piece of steel plate can be used to extend the bearing surface into a larger flange.

>
> But I did not give up.

That's what it's all about. Real life throws up challenges like this. For fuller details of the north american version of the alternator, contact Robert Budd in Ontario <http://www.windmill.on.ca>

> I noticed that while most vehicles had front disc
>brakes there were still a few with front drum brakes. Some of the drums
>were quite large and would seem to be appropriate for the task. The price
>of drum+spindle is \$54....certainly easier to remove and more affordable.
>
>Has anyone used one of the front drum/spindles to build the alternator?

I see no reason why a front hub should not be suitable so long as the brakedrum is deep. It's hard to find them though.

--
Hugh

Laminations

At 2:48 am +0000 4/5/01, gbrecke@yahoo.com wrote:
>I finally broke down and ordered the N.A. version of Hugh's brake
>drum mill. I have all the bits except the proper sized laminations.
>The closest I've found so far is 9 1/4 inch diameter.

Lams are often a problem, it seems. I have never built one of the North American version yet. Robert Budd is the man. The magnets for this version are now available from wondermagnet.com

I found out recently that the north american version has a problem with inadequate space for magnets if the drum is exactly 12 inch internal diameter. The drum actually needs to be skimmed out on a lathe to accept 16 magnets if they are really full 2 inches wide (50mm is OK). Skimming out brake-drums is a very standard operation which should not cost much to do (and may have already been done if you have an old one).

> The local scrap

>dealer and two rewind shops have been very enthusiastic and have
>actually volunteered to pile up motor cores for my return visit. As
>soon as you tell them you're attempting to build a motor out of a
>brake drum, they seem to become interested and helpful.

fun, isn't it :-)

>
>I want to point out that I have only looked at about twenty-five 3
>phase motors so far, so it's not that I can say I'm having a
>hard
>time finding the proper laminations. But I really am curious to know
>how others are making out? I also saved this 9 ? inch set of lams
>just in case I don't find the 9 ? inch set.

Ideally you want 9.5/8 or even 9.3/4 inch lam diameter for that. A smaller lam gives you more room for manoeuvre with the airgap though and even more room for a heavier winding if you want to. There is some loss from having too small lams but you can still get a result. 9.1/4 seems very small. One idea to improve that would be to glue steel pole pieces onto the magnet faces, which would narrow the gap. Or you can take a 10 inch lam and skim it down. Try not to short circuit the lams to each other.

I have put some useful extra ideas about the brakedrum building process on <http://www.scoraigwind.co.uk/brakeupdate>

>
>After spending some time reading various threads, I see that there
>are a few individuals that have mentioned making their own
>laminations. This has caused me to think of ways to produce such a
>thing in small numbers. The other day, I visited a good friend who
>specializes in water jet cutting. He explained that cutting a stack
>of laminations would be no problem for a water jet cutting machine.
>If you are not familiar with this technology, small garnets are
>injected into the water stream and do the actual cutting.

>
>There are several potential benefits to this method of forming
>laminations, small batches are possible, and Unlike a punch die, you
>can change the CNC program to improve your design if necessary.
>Since the cutting is done under water, there is no heat distortion.
>As I see it, the water cut laminate might even look better than a
>part off a punch press?

sounds good but how much does it cost??

>

>If moderate amounts of laminations were to be created, a large stack
>of sheet metal could be inserted in the tank, and the CNC program
>could cookie cut rows and columns of same.

>

>Hmmm, I wonder how much interest there would be in a set of custom
>laminations for the brake drum machines?

Incidentally there are a couple of things to watch out for when using old lams. Beware of rivets near the edge which can short circuit the lams and create eddy currents. They act like coils but the current flow within the lams and not the copper. Remove any such rivets or straps, and clamp the lams using bolts through the slots. Another thing to watch for is slots or flats on the circumference. Fill these with resin loaded with iron filings to get the best results.

I am always here to offer help where I can.

--

Hugh

Scoraig, in Scotland.

<http://www.scoraigwind.co.uk>

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At 02:21 PM 5/11/02 -0700, Daniel Day wrote:

>Hello all,

>

>First of all, many thanks to Hugh, John, Randy, Joseph and
>Larry for their answers on- and off-list to my question last
>weekend.

>

>I fot a scrapped motor and cut open the case in order to get
>out the core. In cutting open the case, I messed up big
>time: not realizing the core is just inside the case, I cut
>into the core, and thus the laminations are now shorted to
>each other by the cutting slag. Thus, question 1: Can this
>core be saved?

>Assuming it can be saved by (I assume) just detaching the
>laminations from each other, filing off the slag and
>re-stacking the laminations, I would also like to ask the
>best solvent for removing the motor windings from the inside
>of the core.

>

>The core is about 10-1/4" in diameter. It looks like a brake
>drum with a 12" ID will be about the right size.

>

>Dan Day

>Corbett, OR

Dan,

I don't think you need to worry about what you have done to the core. There is always some electrical connection between the laminates in a core. Just file or grind off the slag.

As for a slovent for removing the windings, I suggest elbow grease.:) What I do is use a band saw to cut thru the copper near the laminates on one side and then pry the turns out the other side with a screw driver or some other prying device.

Jim Hannon

=====

Hi Dan,

Just a my two cents here.

You only really have to remove the outside welds that hold the lams together. It was strange when I first saw them too but, thats how the big motor lams are held together. That's why the lams are "shorted." It is not the power loss that's a big deal. The problem is when you glue your coils over those welds, the welds will act like shorted coils and make heat and melt the glue. Just grind them out and don't worry about it.

This part is NOT recommended but included for those that want to take the lams apart;

{

I took my lams apart and cut them down with tin snips so it would fit. It wasn't half as bad as it sounds. Came out pretty good and round. The problem I had was when I tried to glue it all back together. The wet epoxy is like oil, slipping and sliding around. Then when I finally got it where I could clamp it, I couldn't clamp it perfectly flat. It has little vallies where the clamps were and hills where they weren't. Next time I'll glue about 6mm(1/4") at a time and glue those pieces together. Bottom line: Don't take it apart, Unless you just can't resist. I wanted to pratice so I could try to make a stator with slots and compare the performance difference.

}

Another thing I found out was: You don't have to glue the magnets in right away. You can wait until you've completed the stator. Just in case you need some more clearance. Grinding the magnets should be avoided but, it is much, much easier to do with out them glued in! Plus in case you change your mind, after hand testing, you can get your magnets back.

Thanks RonD

Rectifiers (diodes)

From: "Jack Crain" <crainknives@hotmail.com>
To: hugh.piggott@enterprise.net
Subject: Re: more info
Date: Fri, 21 Sep 2001 17:41:31 -0500

Hi ,

I just got the Brakedrum Windmill PlansThat is what I was writing about. The rectifiers spoken of on page 17 and are not in the list of parts...

Ooops. Nobody has pointed that out before that I can remember

Are all rectifiers the samecan you put any rectifiers any size any voltage on this windmill?

The rectifier(s) have to be able to handle the full output current. I normally use 2 'single phase' rectifiers. If you expect (say) 20 amps output then you would want at least 15 amps rating on the rectifiers but they are cheap so it is worth over-rating them. You can parallel them to get more current if you cannot find a high enough current rating. Voltage ratings usually start at about 100 volts and this is sufficient.

The Plans do not say or explain how it is hooked up .Last paragraph on page 17 says .connect the + side of the battery to one side "of the rectifier?" and connect the -of the same battery (to the other side of the rectifier?"

There is a diagram on page 18 which I thought was quite clear.

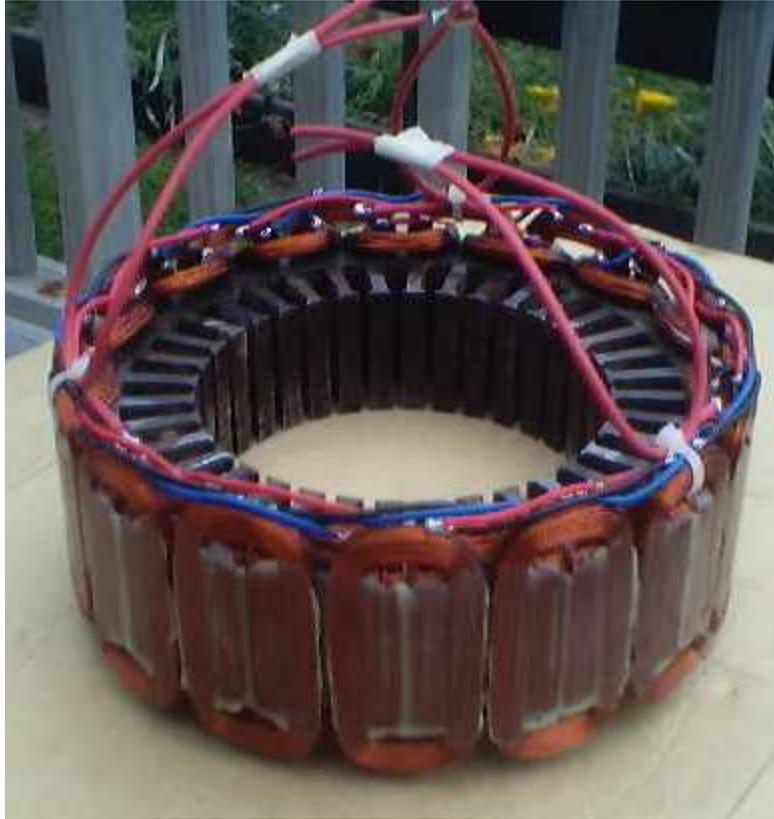
.....yes I guess the rectifier would get hot. This is not real clear , is that correct, I am trying how about a little help before I buy another set of plans.

It does get warm. It is normal practice to put it on a heatsink to prevent overheating which would occur if it was not cooled in any way.

This is what they usually look like-



Fitting coils to the stator laminations - another way to go about it.



Here is a stator wound by Thomas Moar <thomasmoar@xtra.co.nz>. He sets the coils in resin as he winds them and shapes them to fit so that they can be fitted to the stator as shown. Every second coil is bent down, and the others lie on top, so the connections will be different from those where you glue the coils in piles of three at a time. See page 16 diagram 9 you should use the bottom diagram (second example) and not the first example.

Thomas moar wrote:

My coil winding jig is similar to the one shown in " The Homebuilt Dynamo" except that I used Aluminum alloy for the side plates. I found that a few drops of unthickened resin applied to the windings would find its way completely round the coil thus giving a rigid coil after the resin has cured,also it does not adhere to the alloy when fully cured. I made up a jig to bend the ends of the first 15 coils over, I used UHMW plastic for this to avoid damaging the enamel. After clamping this in my bench vise I tapped the ends over using a block of UHMW and a hammer.



Thomas uses 20 neodymium magnets for his brakedrum rotor.

"The Neodymium magnets I used are 46mm x 30mm x 10mm. I got them from MAGNA Co. Ltd. JAPAN. I paid \$100. Thier Email address is. sales@magna-tokyo.com"

From: "thomas moar" <thomasmoar@xtra.co.nz>

To: "hugh piggott" <hugh.piggott@enterprise.net>

Subject: Re: Neo alternator tests

Date: Sat, 10 Nov 2001 13:38:07 +1300

Thanks Hugh,

I happened to have a 1000watt Radiator rod, This is a round ceramic rod

overwound with resistance wire.

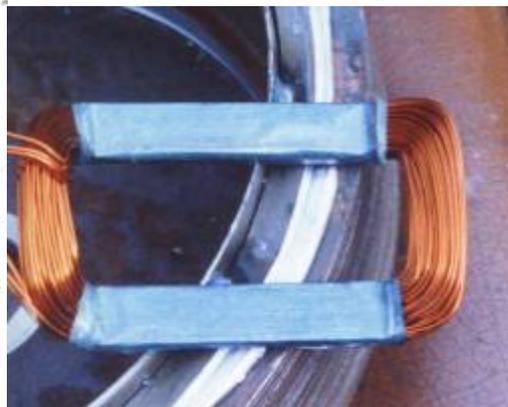
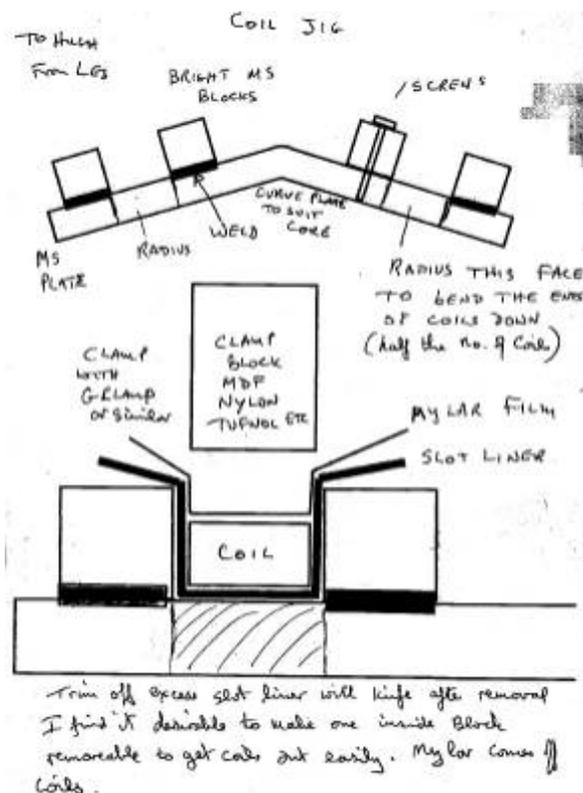
After connecting this to the DC output I got the following results.

At 55rpm = 26v DC. 157rpm = 75v DC. 172rpm = 81v DC. 212rpm = 97v DC.

282rpm = 132v DC. 471rpm = 214v DC. At this point the Radiator rod is red hot so I guess that I have pretty close to 1000watts.

With my test set up I am able to put my finger on the coils of the alternator, after a few minutes I can feel no heating, Maybe I should let it run longer? Thomas.

Les Vincent <les@vincent7288.freemove.co.uk> has built a very nice machine using very similar techniques of his own. He first sets the legs of the coils in epoxy resin using a former which presses them into the right shape:



Les writes: "The blue stuff round the coil is a cheap slot liner material, elephantide with a polyester layer bonded on. I just have lots of it. The ideal material would be un callendared nomex but could be difficult to get in small quantities. Ordinary Nomex would do, from R.S. but is stiff to work.

The elephantide is only a class E (120 degree) insulation, but I used the SP wood glue that you use and I have no idea of it's temperature limits. I wouldn't trust it above 100 degrees.

"I wind the coils on a simple split former as you do. I then clamp them in another former and set them in resin. The slot liner material acts as the release agent and provides the insulation from the core and also interphase."

Then he assembles the stator in the same general way as Thomas:



The 20 magnets used are also neodymium ones, with a rather unsuitable curve on them, but they are nicely fitted to the rotor by painstaking machining.

This 20 pole machine can produce over 1kW at 320 rpm with approximately 70% efficiency.

Hello Hugh,

This is Michael O'Brien in Australia.

Hi. Is it OK to put your message and my replies onto my web page
<http://www.scoraigwind.co.uk/brakeupdate> ?

I recently purchased your book, Brakedrum Windmill Plans and have been reading it with interest. Thank you for writing it and making it available.

It was a pleasure.

If it's okay, I'd like to ask you a few questions please...

1. How did you attach the laminated core inside the brakedrum?
(Unless I missed it, it doesn't seem to be covered in your book.)

check the web page above for more detail. I agree it is poorly covered.

2. You made your design to be most efficient in low winds, but your book talks about your site being so windy that other wind turbines have failed. This is a bit confusing. What is the normal wind speed in your area?

Average windspeed is about 6m/s (13mph). We get some very high winds, but at those times the batteries are usually full. What matters to me is to get good power output in low winds so that the power supply is more consistent. And to survive the gales. In high winds it is easy to get plenty of power at low efficiency, but in low winds there is very little to be had so that is when the machine needs to be very efficient.

3. How can I relate the RPM to the wind speed?
(Eg. You say it cuts in at 200rpm with 24v, but how much wind does it take to reach 200rpm?)

The rotor tip speed ratio is designed to be around 6, I think. But at cut-in it will be unloaded and therefore run at a higher speed say 7.5. To work out the windspeed at which it can do 200 rpm, first work out the tip speed at 200 rpm and then divide by 7.5 (or so).

Tip speed is $200/60$ revs per sec $\times 2.1 \times 3.14$ metres per rev = 22m/sec

cut in speed will therefor be about $22/7.5 = 3$ metres per second wind.

Finally, and this may be the most difficult to answer... I'm also trying to design and build an alternative style wind turbine: One with vertical wings rotating around a vertical axis. From what I've read, this will rotate faster than other types - with the potential to produce more power from the same amount of wind.

there is a lot written about vertical axis but they are not so successful in reality. There are serious fatigue problems and the performance is not that great. I do not recommend this approach.

Once I have tested the design to determine its normal rpm for our wind conditions, how do I translate that into a suitable alternator design?...

Is it best to find as big an electric motor as I can find - and a brakedrum to suite - or just wire the one you suggest for your turbine differently?

a bigger one will give more power at lower speed.

Thank you very much for your help.

Kind regards,

Michael O'Brien
(Tasmania, Australia)

you are welcome.

Tail furling system

To: ilcarrascosa@fatronik.com
From: hugh piggott <hugh.piggott@enterprise.net>
Subject: Re: Last question

At 11:38 pm +0200 7/4/02, ilcarrascosa wrote:

Thanks for your answer, Mr Piggott.

Anyway, I understand yet the movement and the angles of the tail vane and boom (15° to allow the vane go up in a cone-way, and 45° to allow the vane to turn 90°). But I still not understand how the lift and the weight could be balanced. I mean that the tail-vane weight is a vertical force, and the lift and the thrust are horizontal, doesn't they?

If you have a cart on a ramp you can use a horizontal force to push it up the ramp. It moves vertically. The weight of the cart will oppose the movement. When you stop pushing, the cart will run down, and move you horizontally if it has to.

From: "ilcarrascosa" <ilcarrascosa@fatronik.com>
To: <hugh.piggott@enterprise.net>
Subject: Thanks

Hello again Mr Piggott.

I decided to draw the mechanism on 3D to understand on the space the movement of the tail-vane, and finally I've seen right that the the relative turning around the axis wich connects the boom and the rotor is the main reason (this 15°). When I saw on your book I couldn't imagine exactly how could the tail-vane get upwards, but once drawn and gived movement to the mechanism I've understand.

I send you two drawings of the mechanism. This is only a basic scheme, and the tail, tower and nacelle dimensions are not the right ones (now I'm going to start with the calculations of the real dimensions, and also thinking on re-designing the furling mechanism).



It goes without saying that if anytime you need help with drawings or something else, please tell me and I will be very proud to help you.

Best regards, Mr Piggott.

From: "josephurrisi" <jturrisi@hotmail.com>

Mailing-List: list awea-wind-home@yahoogroups.com; contact awea-wind-home-owner@yahoogroups.com

Date: Sun, 05 May 2002 03:25:49 -0000

Subject: [a-w-h] Re: Axle bearings in brake drum

The best way to find out if the bearings are full floating is to look at the axle. If it is a full floating design you will be able to remove the axle from the rear end housing without taking the wheel off. The most common axle of this design in the USA is the Dana 60. It can be found in most 1 ton pickups and some 3/4 ton pickups. Again you will be able to remove the axle shaft from the housing without having to take off the wheel. These axles also have a 8 lug bolt pattern that holds the wheel/tire on.

--- In awea-wind-home@y..., Daniel Day <gamshara@T...> wrote:

> Hello all,

> I have a question for Hugh Piggott and the mechanics in the

> list about Hugh's specification of the type of support

> between the drum and axle in his brakedrum windmill plans:

- >
- > 'You need "fully floating" bearings on the hub, i.e. the hub
- > must be supported by two bearing races, even after the half
- > shaft is removed.'
- >
- > Is there a way to find out if the bearings are fully
- > floating aside from cold-calling auto mechanics (I hate to
- > be a pest) or looking the truck model up in auto-repair
- > books in the library (I did, but no books had this
- > information)? Also, if the brake drum is large and
- > bell-shaped, rather than cylindrical, and is mounted on a
- > pickup truck, can we assume that the bearings are this type?
- >
- > I found a large brake drum on a Chevy Scottsdale at a local
- > junkyard. The OD was over 14" and the length of the exterior
- > at the largest-diameter portion of the drum, corresponding
- > to the section where the brake pads are applied inside the
- > drum, was about 4". As long as the bearings are the right
- > configuration, this drum looks like a good prospect.
- >
- > Can anyone give any pointers here? Thanks much in advance.
- >
- > Dan Day
- > Corbett, Oregon

[More pictures of the job in progress \(click here\)](#)

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