DOE/R4/10212--T1
Wind-Powered Generator

FINAL REPORT

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The above mentioned project (wind-powered generator) has been completed with close-out date being March 31, 1982. All phases of the project were a challenge due to the fact that no set plans were used. Instead, construction was slower than anticipated and some parts had to be redone and refitted to obtain desired operation of the machine.

Construction went pretty well as planned except for some of the change of plans for the parts and the weather. Cold days and rain during Jan. and Feb. of 1981 seemed to be a problem as far as construction of the support structure and other parts which had to be fabricated outside.

The first problem encountered was the generator which was thought to be a 1800 rpm unit but was designed for 3600 rpm which would not work for the machine as planned. A generator of the correct rpm was located and used instead.

We did a lot of work and experiments concerning the drive mechanism and pulley arrangements. The best solution seemed to be the reliable chain drive mechanism which we used and worked out satisfactorily. The gear ratio is about 20 to 1 which gives the desired rpm to the generator with shaft speed about 90 rpm. All of the bearings used in the project are ball-bearing type which should give long life and require only annual lubrication. Bearings used were self-aligning type to assure ease of movement for the shafts.

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More trouble was encountered concerning construction of the blades than any other parts. The blades are constructed of an aluminum center with marine plywood sandwiched between the aluminum center and the fiberglass outer covering. The blades are tapered on the leading edge and are concave on the back-side of the trailing surface. Construction of the blades consumed as much time as planned for the complete construction of the project. Balance was achieved by grinding the heavier blades to match the lighter one. Weight was $19\frac{1}{2}$, $19\frac{1}{4}$, and $19\frac{3}{4}$ pounds. An extra coat of fiberglass was applied to the one which weighed $19\frac{1}{4}$ pounds and all three came out at about $19\frac{1}{3}$ pounds. The blades are balanced extremely well to be constructed without any specialized equipment for this type of work. They are painted with an epoxy-based paint which should last several years without recoating.

The supporting structure is assembled from $\frac{1}{4}$ x 3 x 3 angle iron and built in a straight square form. Overall height is 76 feet from ground level to the top of the structure. No problems were encountered with the structure and construction went as planned.

The batteries used in the project are 250 amp-hour wet cells (Sears Die-Hard Commercial) and are connected in series to obtain the desired voltage level (120v). These batteries charge well and hold a desired charge for long periods of time. They were charged one at a time before installation.

Current from the wind generator and batteries is presently being used as auxiliary power for lighting for my home. I plan to begin construction of a solar system this year and the batteries will power the pumps and fans for this system.

Total output of the generator from December 1, 1981 until March 15, 1982 was 53 kilowatt-hours. Most of this current was used in charging the batteries as they were not fully charged upon installation.

The entire project works as well as expected and has proved to be a useful and knowledgeable experiment. Much interest has been generated by the construction of this unit. Neighbors are pleased with it and no complaints have been encountered. Articles have appeared in many newspapers in North Carolina about it and TV coverage of it has been asked for by WBTV (Charlotte).

I am grateful for the opportunity to build this project as it completes a long desired dream. I think wind power is sure to be part of the future of the world and the Department of Energy should be praised for the decisions it makes to give experimenters the opportunity to build their ideas into working projects.

I am enclosing a picture of the project and if any questions are not answered or any other information is desired, please let me know.

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