

Wind Energy Utilization for Generation Of Electricity On An Automobile

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Abstract

We are quite aware that numbers of vehicles on the road are increasing exponentially day by day leading to huge consumption of precious fossil fuels. In this research paper, the possibility of use of non conventional energy mainly conversion of wind energy into electrical energy of a vehicle is tested. When a car moving on a road accelerates, the air flowing over the car bonnet also increases. Here an attempt is made to utilize this wind energy as an input energy for electricity generation. For this purpose CPU fans having DC motors are mounted on bumper of a car. These DC motors when used in reverse way, they generate an electrical energy. This electrical energy could either be used as a supporting charging system to the main battery in the car or to run some of the major electrical systems in the car such as a radiator fan, horn, brake light, parking light etc.

I. INTRODUCTION

I. METHODOLOGY

In order to increase the fuel economy of a vehicle, load on the vehicle engine need to be reduced. There are various methods to reduce the load such as reduction in weight of the vehicle; another method is to assist the alternator for battery charging purpose or to run some electrical system in the car by some other way.



There are number of electrical loads on the engine. Some of them are mentioned below.

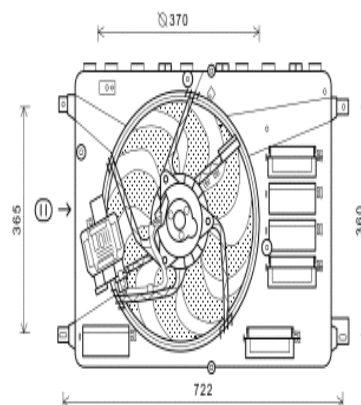
- ☐ Radiator fan high speed (240W), Slow speed (105W)
- ☐ AC blower
- ☐ Water pump
- ☐ Head light (230W)
- ☐ Parking lights, Stop lights (50W)
- ☐ Fog lights (110W)
- ☐ Music system & speaker (100W)

- ☐ Power window (350W)
- ☐ Wiper (60W)

Now, if some other source is found to support the charging of a battery to assist alternator i.e. to run any of the above mentioned electrical system by some other source, then by reducing load of alternator on an engine to some extent, the fuel economy of the vehicle can be improved slightly. In the long run, this slight increase in fuel economy can save substantial amount of fuel used.

List of Components:

- ☐ CPU fans DC, 12V, 0.27A, fan units-10 Nos.
- ☐ Mounting mechanism: 'L' shaped steel brackets
- ☐ Battery
- ☐ Wiring for connections
- ☐ Air sealing



A. Fans

10 CPU fans are used in this system by considering the available space and also proposed power output.

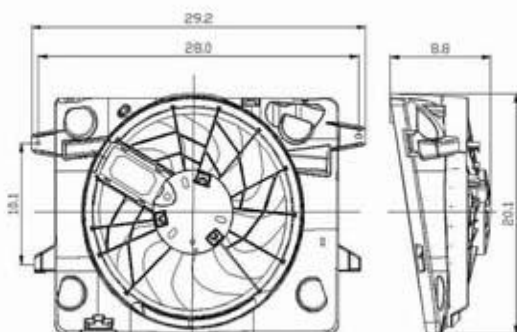


Table 1: Features of fans

Fan type	DC axial fan
Make	Nidee
Model used	TA350DC
Rating 7 blades,	12V DC, 0.27A.
Length	92 mm
Breadth	92 mm
Thickness	32 mm
Inner diameter	90 mm
Max. air pressure	6.9 mm of H ₂ O
Max. air flow	1.66 m ³ /min.
Housing Thermoplastic	PBT, UL94V-0
Impeller Thermoplastic	PBT, UL94V-0
Bearing Sleeve or Ball	
Operating Temperature Sleeve	Brg.- 100C to
+700C,Ball Brg.	300C to
+750C	
Insulation Resistance	10 mega ohms
min. @ 500	
	VAC 60Hz for 1
minute	(Between Frame
and Terminal)	Weight 75
Grams	

Table 2: Specifications of Bumper

Length	950 mm
Breadth	93 mm

B. Bracket

The CPU fans are fitted to the bumper with the help of 'L' shaped brackets and fasteners. Dimensions of brackets are 50×20×1.5 mm.



C. Air sealing

Air sealing is used to cover the gaps present between the two fans and between a fan and bumper. This will ensure that air coming on the assembly will be passed through the fans exerting maximum pressure on the fan blades so that fan will run faster.



D .Battery

An automotive battery is an electrochemical device that stores electrical energy. The system does not produce electrical energy at constant rate as the electrical energy generation depends on speed of the vehicle. Hence, the electrical energy produced by fans cannot be given directly to any one of the system in the vehicle. By using regulator the voltage supplied to battery is regulated to 12V for charging. And the supply from the battery can be to any desired system of the vehicle.

II. RESULTS

After mounting of fans on bumper, the tests are carried out for different connections of fans at

different speeds of car considering the direction of the car and direction of the wind and their effect on the output. The output in the form of voltage and current at different speeds is measured. Trial 1 and 2 were taken without any load on the system and multimeter and clamp-on meter were used for voltage and current measurement.

A. Trial- 1

Two fans were connected in series, to get five pairs altogether, which were connected in parallel. While taking the readings (Table 3), there was effect of the wind on the system.

Table 3: Results of trial 1

Speed(kmph) Power (W)	Voltage(V)	Current(A)
20 1.5	7.5	0.2
30 2.79	9.3	0.3
40 3.78	12.6	0.3
50 4.56	15.2	0.3
60 1.6	16.0	0.1
70 4.83	16.1	0.3
80 7.12	17.8	0.4
90 11.04	18.4	0.6
100 22.11	20.1	1.1
110 28.34	21.8	1.3
120 33.18	23.7	1.4

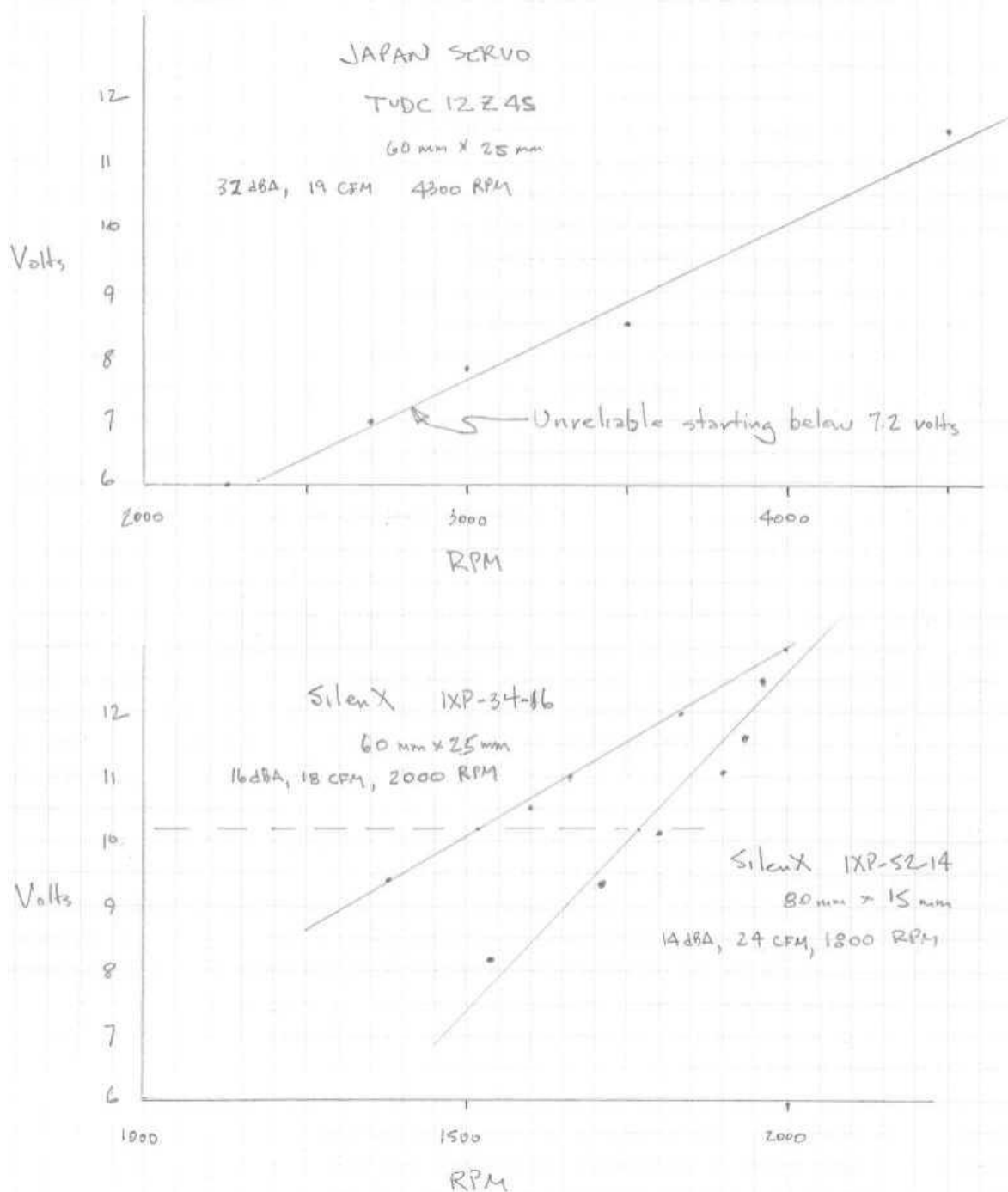
130 16.73	23.9	0.7
140 21.6	24.0	0.9

B. Trial-2

Now, all fans were connected in parallel. The readings were taken on the straight road (Table 4). While taking the readings, there was minimum wind effect on the system

Table 4: Results of Trial 2

Speed(kmph) Power	Voltage (V)	Current (A)
	Up	Down
(W)		
20 1.4	2.0	0.7
30 3.1	3.1	1.0
40 6.3	4.5	1.4
50 10.62	5.9	1.8
60 17.38	7.9	2.2
70 26.88	9.6	2.8
80 34.98	10.6	3.3
90 40.33	10.9	3.7
100 49.02	11.4	4.3
110 56.4	12	4.7
120 62.764	12.07	5.2



III. APPLICATIONS

This system generated output of nearly 48W. Thus, an auxiliary battery could be charged by regulating the voltage at 12V and then using this charged battery, anyone of the following system can be run.

AC compressor clutch
 Fog lamps

Parking lamps
 Washer motor
 Brake lamp
 Reverse lamp

IV. CONCLUSION

In the field of automobile sector, this kind of experiment is new. By implementing this system on

an automobile, the fuel efficiency of an automobile increases without hampering environment. Moreover, the cost of the project is low and could be recovered within three years. In the first trial the expected results were not satisfactory. However, in second trial the output of 50W at the speed of about 100 kmph was achieved. With this much output, any one of the electrical systems in the vehicle could be operated with the help of second combinations of fans. Again it is observed that when vehicle is accelerated the output increases and vice-versa.

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