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Design and Implementation of Green Energy Based Electrical Power Generation System

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ABSTRACT*:* Due to the growth in requirement of electricity by the industries, and the waste gases produce by the industries, which goes completely in loss account, this reason inspired us to developed and electrical generator which can work on that waste gases as well as on the natural air, the electricity produce by this generator will be extremely at low cost and will be very beneficial to the industries, The main aim of this work is to used waste gases as fuel to minimize the running cost, charging time, pollution, recover losses of electrical generator and also to maximize it efficiency so that it can run for maximum time as possible to the each and every user, here in this paper we have descried the complete design of the generator the electronic circuit to increase its output simulation of circuit and the result of demo model of that generator, fail results of demo model and we have also give the AutoCAD simulation and implementation of a electric generator which can run on industrial waste gases as well as on natural air

KEYWORD: chimney, compressed air, waste gas, air turbine, alternator, inverter, boost up converter, AutoCAD

I.INTRODUCTION

From the basic analysis of the present days the industries are in need of more and more electric power from their daily application, therefore some industries used to produce electricity by its own, but this is very costly for the industries to produce electricity and also harmful to environment, this stimulate as in the field of electrical power generation, therefore we are constructing an electrical generator which will work on the industrial waste, there are solid, liquid and gases waste in industries from which we are going to used gases waste of the industry as a fuel to generate electricity, this will be beneficial to industries as well as friendly to environment, so in this paper we have describe an generator which can run on industrial waste gases, can be run directly on the waste gases which is emitted by the chimney (with little modification in chimney)or can be used on the waste gases which is first stored by compressor, The system will be extremely handy at the place where we have to control only ON and OFF switches for operating, the complete design circuit simulation and the AutoCAD simulation of this generator is shown below.

II.SYSTEM DESCRIPTION

This system consist of waste gases, compressor, storage tank, air turbine, DC generator, boost up converter, inverter. The schematic diagram of this system is shown below fig 1.

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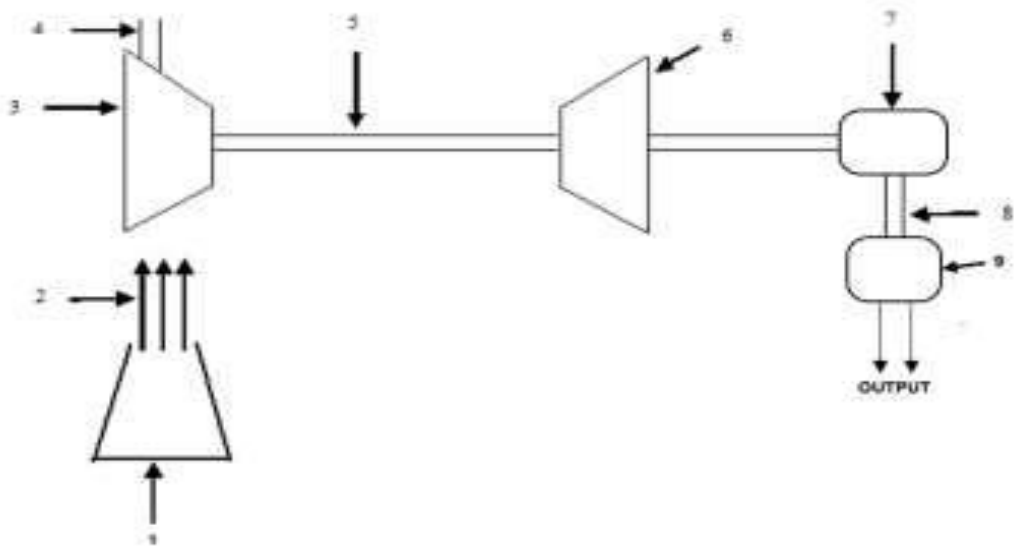

Fig. 1 schematic Diagram of the System

Referring to the drawings, FIG. 1 schematically illustrates the arrangement of the typical. Green Energy

Based Electrical Power Generation System.

The numbers in the FIG.1 indicate the following parts of the system.

1 (Chimney) or (compressed gases)

2 (Exhaust smoke) or (pressurized waste gases) or (natural air)

3 Air Turbine

4 Exhaust of air turbine

5 Connection line

6 Alternator

7 Boost up converter

8 Supply line

9 Inverter

10 Output

The first thing in this system is a exhaust smoke from the chimney or compressor which will forced waste gases to store in the compressing tank at very high pressure, this process is already present in the industries so no need for additional equipment, this system as shown there all component are installed as shown, if this system is used on chimney than it should be installed at the top of the chimney and if it is used on compressed gas than it should be installed near the system and connection pipe is provided from pressurize tank to the inlet of air turbine, an mechanical

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support is provide to the system in both the cases, than after this waste gases at high pressure will be carried out to drive an air turbine it will produced rotational motion and start driving alternator.

As the alternator start the output of the alternator will be given to the boost up converter for providing maximum output to the industries, this will increase its efficiency and durability of the system, than after we had built an inverter so that the industries which need AC supply can also use this system.

Circuit description

The circuit in this system is consist in two parts one is boost up circuit and another is inverter circuit, detailing of those circuit is given below

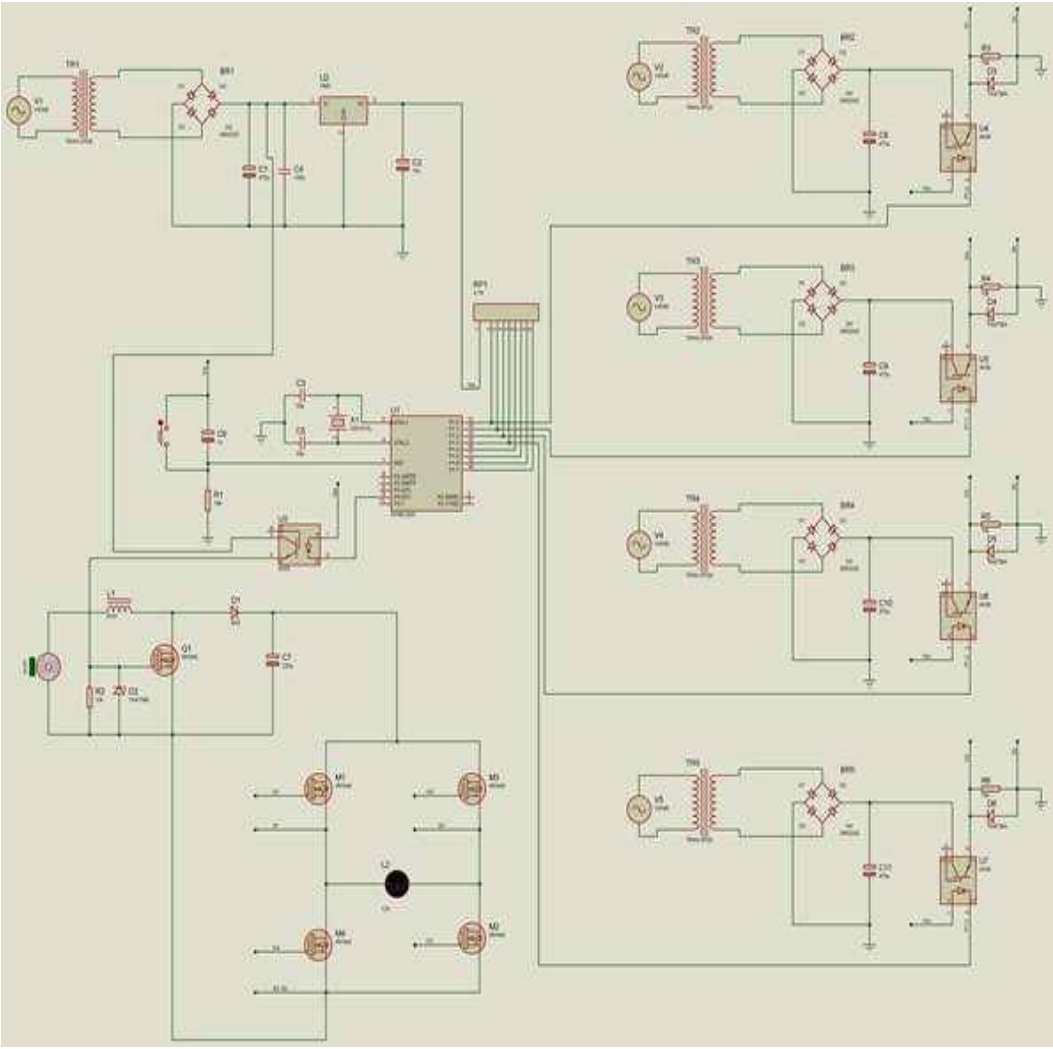

Fig 2 circuit diagram of boost up converter with inverter

This is the circuit diagram of boost up converter connected with invertor, for the industries which need AC supply of the operation, this circuit contain component are listed in below table

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Sr.no	component	Number of component	Rating of component
1	MOSFET (IR840)	5	Q1= 8A
			M1= 8A
			M2= 8A
			M3= 8A
			M4= 8A
2	Bridge	5	BR1= 1A
			BR2= 1A
			BR3= 1A
			BR4= 1A
			BR5= 1A
3	Transformer	5	TR1= 100mA
			TR2= 100mA
			TR3= 100mA
			TR4= 100mA
			TR5= 100mA
4	Capacitor	11	C1= 470u
			C2= 10u
			C3= 33p
			C4= 100n
			C5= 33p
			C6= 6u
			C7= 220u
			C8= 470u
			C9= 470u
			C10= 470u
			C11= 470u
5	Optocoupler (4N35)	5	U1= 5v
			U2= 5v
			U3= 5v
			U4= 5v
			U5= 5v
6	Resistor	6	R1= 10k
			R2= 10k
			R3= 10k
			R4= 10k
			R5= 10k
			R6= 10k
7	Diode (1N4739)	6	D1= 6A
			D2= 9.1v
			D3= 9.1v
			D4= 9.1v
			D5= 9.1v
			D6= 9.1v

Table no. 1 components of boost up converter with inverter

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The components listed in the table are combination of both boost up converter and the inverter, it is not necessary to use those two circuit together, if industry need a DC sully than the inverter circuit cand be eliminated and the operation can be carried out the boost up converter.

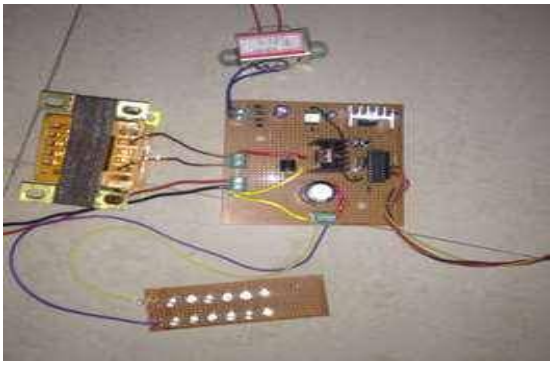

Fig. 3 boost up converter

The purpose to use this boost up converter is to increase the output voltage to meet the requirement of industries, this converter will also increase the efficiency of system the input we take to charge the compressor is more so this thing will help in achieving our goal to increase the output from the input taken. If the industry need an AC supply than they can connect the invertor with the boost up converter

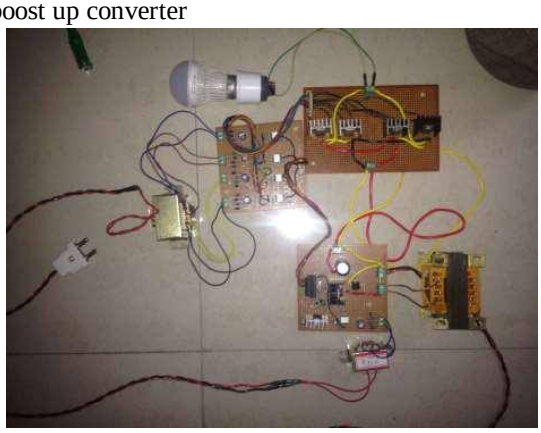

Fig. 4 boost up converter with inverter

The above fig shown the complete connection of boost up and invertor circuit used in this system the component used in this circuits are listed in the above table, here we had also used a microcontroller to generated gate pulse

We had used a microcontroller AT89C2051 to generate boost up gate pulse and inverter gate pulse the flowchart of the program is below

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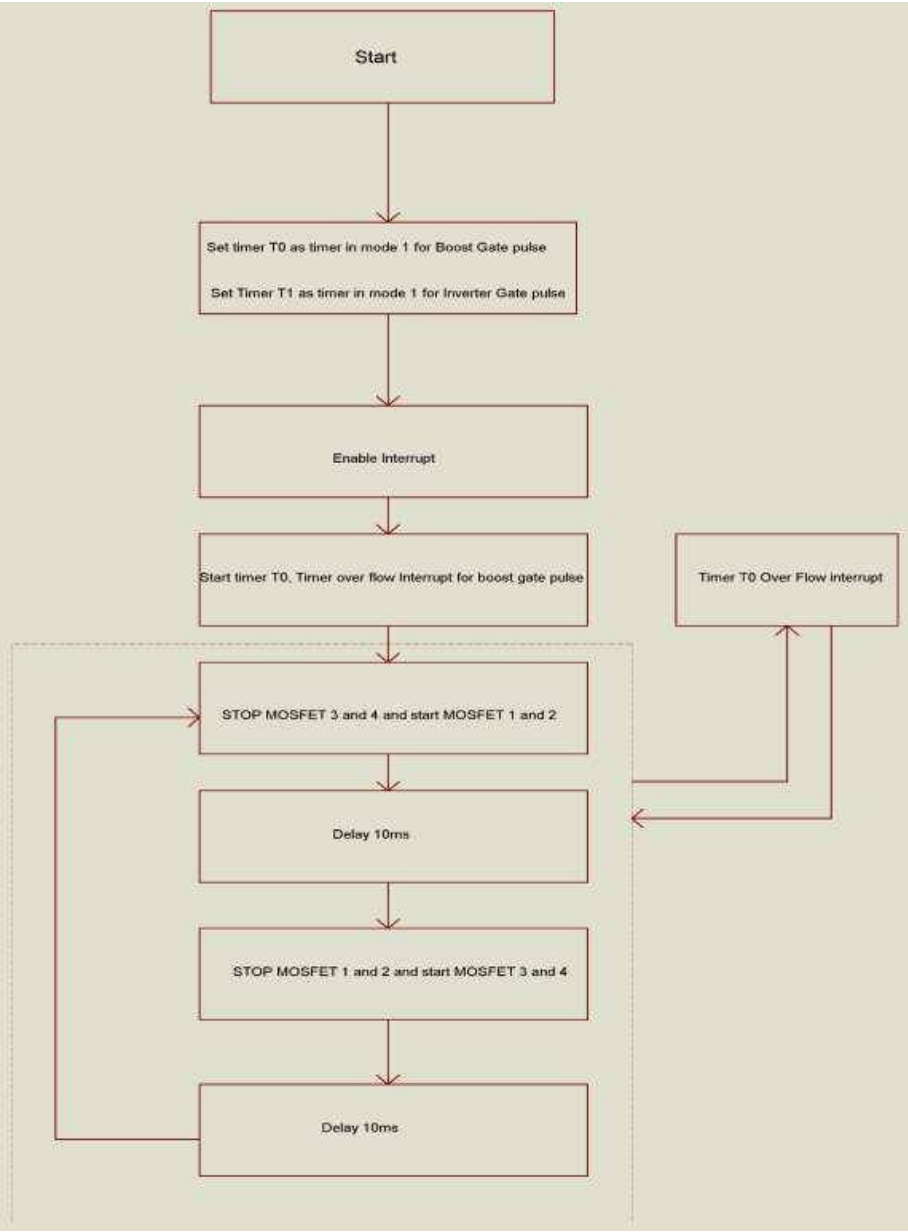

Fig. 5 flowchart of microcontroller AT89C2051

This program will generate the gate pulse in boost up converter and in the invertor

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The gate pulse of boost up converter

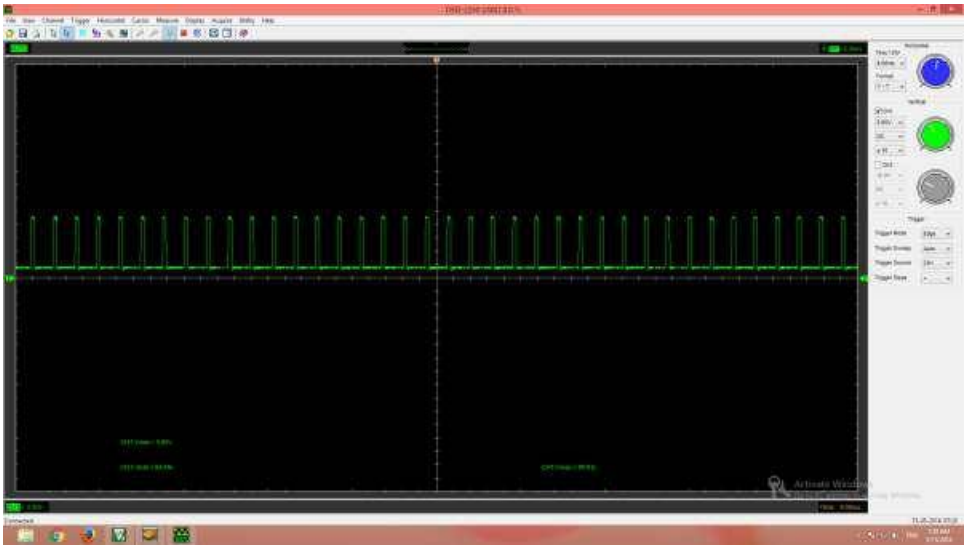

Fig. 6 gate pulse of boost up converter

Here as shown in the fig the maximum voltage is 5.80v and frequency is 961Hz this is a gate pulse of boost up converter shown using DSO (digital storage oscilloscope)

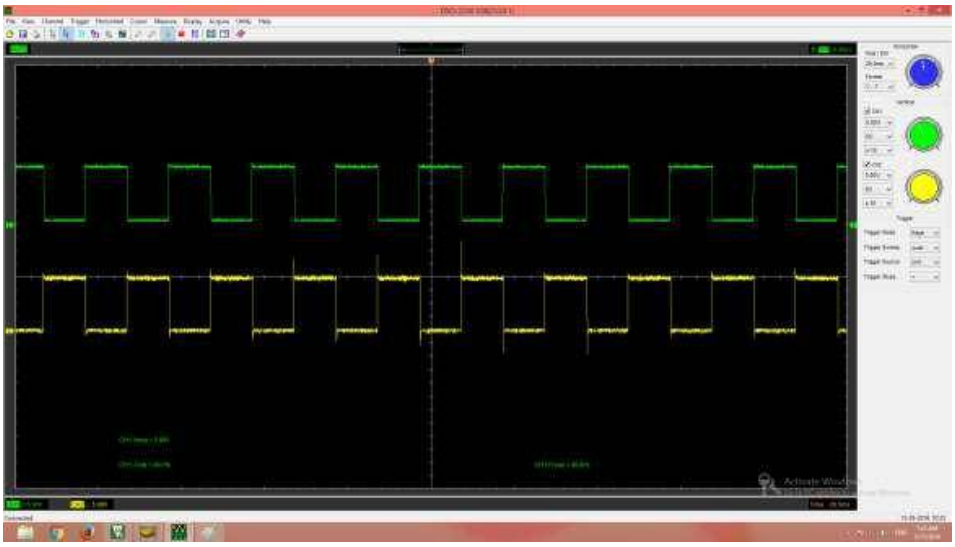

Fig. 7 gate pulse of inverter

Here as shown in the fig the maximum voltage is 5.88v and frequency is 48.9Hz this is a gate pulse of boost up converter shown using DSO (digital storage oscilloscope)

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Demo model result

generator output	5.59 v
Boost up converter output	65.9 v
Invertor output	65.5v
Air pressure	30psi
Fan speed	800rpm

Table no.2 result of demo model

This table shows the results which we had obtained from the demo model we built, the full load capacity of the generator is 12v but it need pressure of 50-60 so that fan can rotate at the speed of 1200 rpm at full rated speed, this pressure is available on compressed air but not in chimney of the industrials so this is a result which will be available on chimney, as the pressure increase the output of the generator also increase so this system can work more efficiently on compressed air but can be used on industrial chimney as well.

V.CONCLUSION

In this paper low cost, secure, easy to control, time saving, waste gases based electrical power generation system has been introduced. The approach discussed in the paper has achieved the target to commercial as well as to the industrial user needs and requirements; the extensive capabilities of the system are what make it so interesting. From this system a user can be able to produces electric energy at very low cost and co-friendly manner because it is totally based on natural air and waste gases produces by industries. This can be the most innovative and user friendly power generation system.

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