Generation of Electricity from Motor and Alternator Assembly

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Abstract- *The project deals with mounting an alternator assembly on press machine so as to generate alternative source of energy.*

The purpose of our project is to reduce the electricity consumption of the organization by generating electricity using alternator for shop floor lightening applications

Methodology

a) *Selecting a specific machine on which assembly would be done*
b) *Mounting of alternator assembly on selected machine.*
c) *Generating electricity by making proper arrangement between alternator pulley and motor belt*
d) *Trial of the arrangement*

Expected Outcomes

Generating electricity from the alternator so as to reduce electricity cost of organization. Also to developing a system which can be easily installed on same kind of machines and whose output can be grouped together.

Keywords- Alternator, Belt Drive, Battery, Feed Mechanism

I. INTRODUCTION

A press is a sheet metal working tool with a stationary bed and a powered ram can be driven towards the bed or away from the bed to apply force or required pressure for various metal forming operations. The relative positions of bed and ram in the press are decided by the structure of its frame. The punch is generally gripped into the punch holder and punch holder is attached to ram. A blaster steel plate is attached to the bed of the press and die is mounted on the blaster steel plate. Presses are available in a variety of capacities, power systems and frame type. Meaning of capacity of press is its capability to apply the required force to complete the operation. Power systems on presses are either hydraulic presses use a large piston and cylinder to drive the ram. This system is capable to provide longer ram strokes than mechanical drives.

An alternator is an electrical generator that converts mechanical energy to electrical energy in the form of alternating current. It works on Faraday's law of electricity that is when an electric conductor is placed in a magnetic field the emf is generated in a magnetic coil. The alternator assembly includes the plates of mild steel which are connected to each other with the help of welding process. Also various operations like gas cutting, grinding, drilling etc. is done on these mild steel plates.

The assembly is done by providing sufficient tension for getting required rpm of alternator. Alternator produces current by using law of electromagnetic induction. This current is stored into battery through cut-off switch (to disconnect the supply when the battery is fully charged).

II. USES AND APPLICATIONS

Generating electricity from the alternator so as to reduce electricity cost of organization. By supplying the stored electric supply from battery to the various electrical appliances .Also to developing a system which can be easily installed on same kind of machines and whose output can be grouped together.

III. CONSTRUCTION AND WORKING

Fig.1 Assembly

The required components are selected according to the load calculations .The electrical energy that is consumed by a component, circuit, device, piece of equipment, or system that is connected to a source of electric power, in order to perform its functions, is called electric load.

Sr No	Applications	Quantity
1	Tube Light	8
2	CFL	2
3	Charging Point	10
4	Fan	2
5	Total	22

Table1: Load Considerations

From this load calculation Battery, Alternator, are selected. Raw materials, Fasteners are selected from material of motor base plate. The Battery disconnect switch and various measuring instruments such as tong meter, tachometer, vernier calliper and measuring tape are used to measure current, rpm, length respectively.

a) Mild steel plates are bolted to the motor base plate by M10 Allan bolts.
b) Alternator is then bolted to the plate assembly.
c) The alternator is so adjusted that the alternator pulley is in contact with the belt of the press machine.
d) The angle of alternator is kept so that the alternator pulley is pressed to the belt of motor with maximum tension or force machine.
e) This force or tension will reduce the chances of slip so there will be no loss.
f) Two gauge wires are then attached to the alternator output, one as main and other as earthing.
g) The main wire from the alternator is then attached to the positive terminal of the battery.
h) The earthing wire is connected to the negative terminal of the battery.
i) An indicating lamp is also attached to the alternator which will indicate if the alternator is charging the battery or not.
j) A cutoff switch is implemented between the output of the alternator and the battery thus protecting the circuit from over current.
k) An indicating lamp is connected to the battery which will indicate the charging status of the battery.
l) Battery output is then given to the various points of the workshop by using 8mm gauge wire.

WORKING OF SETUP

a) Initially when the press machine is off , indicating lamp attached to the alternator is ON, This indicates that the battery is not charging
b) When the machine is turns ON, the belt driven pulleys start to rotated. Thus alternator pulley which is in contact to the belt will start to rotate.
c) As the alternator pulley reaches required rpm the indicating lamp is switched OFF.
d) This indicates that the magnetic lines generated in the alternator are cut by the conductors, and thus there is production of electricity.
e) This generated electricity from alternator is used to charge battery. And the output of battery is given to various points in the workshop
f) Thus there is simultaneous charging of the battery as well as utilization of the stored energy. This will reduce overall electricity consumption.

IV. CALCULATION

1. Powerand Current Calculation

Current drawn by the motor at various conditions is mentioned in the table below. Voltage remains constant motor only draws extra current to match the load variations. So current value changes in every condition.

SR NO	Contents	Without Alternator		With Alternator	
		No Load	On Load	No Load	On Load
1	VOLTAGE (V)	415	415	415	415
2	CURRENT (AMP)	1.6	1.8	1.65	1.9

Table.2: Current and Voltage Considerations

2. Overall unit calculation

The unit consumption by a motor and consumption due to alternator, also the generated energy value are shown as below

Before alternator		After alternator	
Electricity Consumed	Electricity Generated	Electricity Consumed	Electricity Generated
V*I*hr		V*I*hr	V*I
415*1.6*8 = 5312 W-hr/day	—	415*1.65*8 =5478 W-hr/day	12*180= 2160 W-hr

Table.3:Overall Units Calculation

Extra unit consumption:

5478-5312 = 166 W-hr/day or166*30 = 4980 W-hr/month

Net Energy generated:

Energy generated - Energy consume
64800-4980 = 59820 W-hr/month or
59820/30 = 1994 W-hr/day

Alternator which is rotating at 3000 rpm is charging battery of 180AH completely in 5 Hrs. This charged battery is used to give power to the applications.

Calculations for battery charging and discharging:

Battery charging time from complete discharged to fully charged state= 4 hrs.

Load required to be run on battery=515W

Battery will run load for hours as calculated below

= Kilo-Watt-hr Rating / Load required to be run on battery = 1.994/0.515= 3.8718 Hrs.

So battery will run load for 4 hrs.

This in turn will save (4*0.515) = 2.06 units in an hour which

That is (2.06*4*30) = 247.2 units in a month.

In terms of cost (247.2*12.5) =3090 Rs will be saved.

But backup can be increased to 5-6 hours as all the given load is not connected simultaneously.

V. CONCLUSION

Mounting of alternator on motor puts negligible load on motor input and this was observed by readings on clamp tester and these readings are shown in voltage and current analysis table

This intern shows that objective of our project is completed as considering following points
a) Alternator mounted produces extra electricity with consuming negligible power
b) Generated power will be used to run 515W
c) This will reduce 247.2 units of electricity consumptions in a month and 3090 Rs will be saved per month.

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