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## Power Generation System a New Approach

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**ABSTRACT:** The project deals with design and fabrication of power generation system using speed breaker. The principle involved is Potential energy to Electrical energy conversion. There is a system to generate power by converting the potential energy generated by a vehicle going up on a speed breaker into kinetic energy. When the vehicle moves over the inclined plates, it gains height resulting in increase in potential energy, which is wasted in a conventional rumble strip. When the breaker comes down then the spring also comes down due to compression of recoil spring, and from this we can get the rotary motion with the help of chain drive. The output of this shaft is coupled to a dynamo to convert Kinetic energy into Electricity energy.

This electrical energy flows through recharging circuit and then stored into the battery. Some of the merits of this system are low budget electricity production, less floor area, no obstruction to traffic and easy maintenance. This system can be used in front of school, colleges, hospital and other places where public gathering is more hence regulation of speeds is required. The primary advantage of this system is production of electricity without wasting any fuel.

**KEYWORDS:** Potential energy, Electrical energy, Spring, Sprocket, Chain Drive.

### I.INTRODUCTION

Whenever the vehicle is allowed to pass over the dome it gets pressed downwards then the springs are attached to the dome is compressed and the sprocket which is attached to the bottom of the dome rotates. Since the sprocket has teeth connected to chain drive, there exists conversion of reciprocating motion of spring into rotary motion of chain drive. A flywheel is also attached with the dynamo whose function is for balancing the shaft. The sprocket will rotate with certain R.P.M, the chain drive attached with the sprocket transmit the rotator motion to the dynamo, which converts the mechanical energy into electrical energy. The conversion will be proportional to traffic density.[1] Whenever an armature rotates between the magnetic fields of south and north poles, an E.M.F (electro motive force) is induced in it. So, for inducing the E.M.F armature coil has to rotate, for rotating this armature it is connected to a short shaft. By rotating same E.M.F, is induced, for this rotation kinetic energy of moving vehicles is utilized. All this mechanism can be housed under the dome, like speed breaker, which is called HUMP. The electrical output can be improved by arranging these POWER HUMPS in series. This generated power can be amplified and stored by using different electrical devices.[2]

### II.SPECIFICATION

The frame is made up of rectangular base of (720 x 680 $mm^2$ ). The material used is mild steel. A dome shaped breaker is mounted on the rectangular frame. One side of the frame is supported on the three helical compression spring. The spring has four numbers of active coils and having free length 52.8 mm. the material used in spring is cold drawn steel wire grade 4. Inside the rectangular frame chain and sprocket mechanism is fabricated. Two sprockets are connected with the chain

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drive having same transmission ratio and same number of teeth. The number of teeth on both driver and driven sprocket is 18. The material used in chain drive is quenched high carbon steel. The centre distance between the two sprockets is 320 mm. The dynamo used is two ways synchronous dynamo which can generate electricity on both clockwise and anti clockwise direction. The power rating of the dynamo is 3W that is 500mA at 6V. The electricity produced by the dynamo passes through the charging circuit and then the electricity is stored in two lead acid batteries which are connected in parallel having 6 V each. An LED is used to indicate the flow of electricity. Two multi meters are used to measure the voltage and current respectively.[4]

### III.COMPONENTS USED IN FABRICATION OF POWER SPEED BREAKER

**SPRING:** A spring is an elastic object used to store mechanical energy. Springs are usually made out of spring steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication. Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance and beryllium copper for springs carrying electrical current (because of its low electrical resistance).[3]

**ELECTRIC DYNAMO:** A dynamo originally another name for an electrical generator, generally means a generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter.

The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faraday's law of induction. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating windings called the armature which turn within that field.

**CHAIN DRIVE:** Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system.[5]

**SPROCKET:** A sprocket or sprocket-wheel is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which are radial projections that engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.

**FLYWHEEL:** A flywheel is a rotating mechanical device that is used to store rotational energy. Flywheels have a significant moment of inertia, and thus resist changes in rotational speed. The amount of energy stored in a flywheel is proportional to the square of its rotational speed. Energy is transferred to a flywheel by applying torque to it, thereby increasing its rotational speed, and hence its stored energy. Conversely, a flywheel releases stored energy by applying torque to a mechanical load, thereby decreasing its rotational speed.

**CHARGING CIRCUIT:** This charger will charge two 6V lead acid batteries. It is fully automatic and will charge at a rate up to about 200 mA until the battery voltage reaches a preset point at which it will switch to a very low current float charge. In this way it can be left connected to a battery indefinitely to maintain full charge without causing damage. An LED indicates when the battery is fully charged and the current is flowing without any hindrance.

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**LEAD ACID BATTERY:** Lead–acid batteries, despite having a very low energy-to-weight ratio and a low energy-to-volume ratio, their ability to supply high surge currents means that the cells maintain a relatively large power-to-weight ratio. These features, along with their low cost, make them attractive for use in motor vehicles to provide the high current required by automobile starter motors.

## 1. NEED OF PERFORMANCE AND TESTING

Performance testing is the process of determining the speed or effectiveness of a computer, network, software program or device. This process can involve quantitative tests done in a lab, such as measuring the response time or the number of MIPS (millions of instructions per second) at which a system functions. Qualitative attributes such as reliability, scalability and interoperability may also be evaluated. Performance testing is often done in conjunction with stress testing. Performance testing can verify that a system meets the specifications claimed by its manufacturer or vendor. The process can compare two or more devices or programs in terms of parameters such as speed, data transfer rate, bandwidth, throughput, efficiency or reliability.

## 2. MECHANICAL LOAD TESTING

The purpose of a mechanical load test is to verify that all the component parts of a structure including materials, base-fixings are fit for task and loading it is designed for the Supply of Machinery. Load testing can be Performance, Static or Dynamic. Performance testing applies a safe working load (SWL), or other specified load, for a designated time in a governing test method, specification, or contract. Static testing is when a load at a factor above the SWL is applied.

## 3. TESTING MEASUREMENT DEVICES

**Stop Watch:** A stopwatch is a handheld timepiece designed to measure the amount of time elapsed from a particular time when activated to when the piece is deactivated. A large digital version of a stopwatch designed for viewing at a distance, as in a sports stadium, is called a stop clock.

**Vernier Caliper:** A caliper is a device used to measure the distance between two opposing sides of an object. A caliper can be as simple as a compass with inward or outward-facing points. The tips of the caliper are adjusted to fit across the points to be measured, the caliper is then removed and the distance read by measuring between the tips with a measuring tool, such as a ruler. It is used in many fields such as mechanical engineering, metalworking, woodworking, science and medicine.

**Light Emitting Diode (LED):** A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

**Tachometer:** A tachometer (revolution-counter, Tach, rev-counter, RPM gauge) is an instrument measuring the rotation speed of a shaft or disk, as in a motor or other machine. The device usually displays the revolutions per minute (RPM) on a calibrated analogue dial, but digital displays are increasingly common. In vehicles such as tractors and trucks, the tachometer often has other markings, usually a green arc showing the speed range in which the engine produces maximum torque, which is of prime interest to operators of such vehicles.

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**FRAME:** The frame is made up of rectangular base of (720 x 680  $mm^2$ ). The material used is mild steel. A dome shaped breaker is mounted on the rectangular frame.

**TUBE LIGHT:** A tube light is used to show that the current is flowing through the circuit and it is generating sufficient power. It also helps to complete the circuit because without completing the circuit current won't be able to flow.

**MULTI METER:** A multi meter or a multi tester, also known as a VOM (Volt-Ohm meter), is an electronic measuring instrument that combines several measurement functions in one unit. A typical multi meter may include features such as the ability to measure voltage, current and resistance. Multi meters may use analog or digital circuits— analog multi meters (AMM) and digital multi meters (often abbreviated DMM or DVOM.).

**METALLIC DOME:** A dome shaped breaker is mounted on the rectangular frame. The dome is made up of mild steel. It helps to achieve the potential energy by giving some height to the wheel from the ground surface.

## IV. OPERATION

**Turning:** Turning is the process whereby a single point cutting tool is parallel to the surface. It can be done manually, in a traditional form of lathe, which frequently requires continuous supervision by the operator, or by using a computer controlled and automated lathe which does not. This type of machine tool is referred to as having computer numerical control, better known as CNC and is commonly used with many other types of machine tool besides the lathe.

**Facing:** Facing is part of the turning process. It involves moving the cutting tool at right angles to the axis of rotation of the rotating work piece.

**Drilling:** Drilling is a cutting process that uses a drill bit to cut or enlarge a hole in solid materials. The drill bit is a multipoint, end cutting tool. It cuts by applying pressure and rotation to the work piece, which forms chips at the cutting edge.

**Threading:** Threading, whether we are referring to external or internal threads can always be done with taps and dies, with the resulting thread almost always turning out satisfactory. A tap or die must be started perfectly in line with the stock being threaded or the thread created will not run straight and true.

**WELDING:** Welding is fabrication or sculptural process that joins materials. Welding generally includes metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material (the weld pool) that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld. This is in contrast with soldering and brazing, which involve melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces. Several modern welding techniques were developed, including manual methods like shielded metal arc welding, now one of the most popular welding methods, as well as semi-automatic and automatic processes such as gas metal arc welding, submerged arc welding, flux-cored arc welding and electro slag welding.

**GAS CUTTING OPERATION:** Oxy-fuel cutting are processes that use fuel gases and oxygen to cut metals, respectively. French engineers Edmond Fouché and Charles Picard became the first to develop oxygen-acetylene welding in 1903. Pure oxygen, instead of air (20% oxygen/80% nitrogen), is used to increase the flame temperature to allow localized melting of

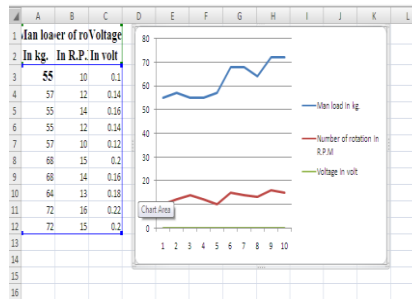
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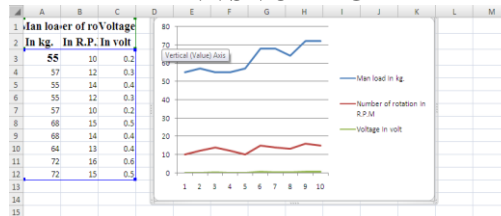
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the work piece material (e.g. steel) in a room environment. A common propane/air flame burns at about 3,630 °F (2,000 °C), a propane/oxygen flame burns at about 4,530 °F (2,500 °C), and an acetylene/oxygen flame burns at about 6,330 °F (3,500 °C). In oxy-fuel cutting, a cutting torch is used to heat metal to kindling temperature. A stream of oxygen is then trained on the metal and metal burns in that oxygen and then flows out of the cut (kerf) as an oxide slag.

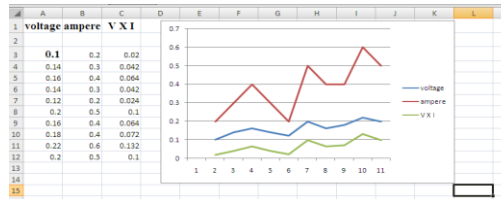
## V. TESTING OF SPEED BREAKER



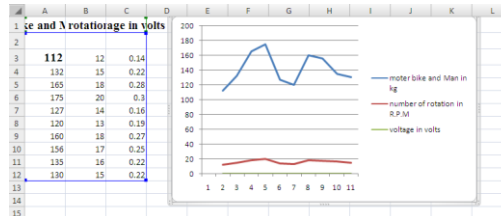
### MAN VS VOLTAGE



### MAN VS AMPERE



### TOTAL MANUAL POWER

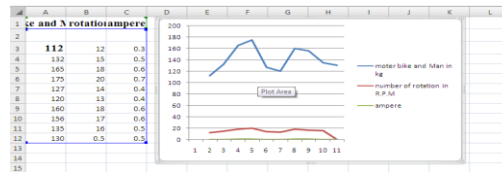


### BIKE LOAD VS VOLTAGE

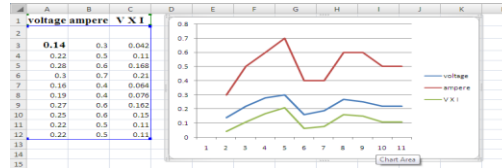
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**BIKE LOAD VS AMPERE**



**TOTAL POWER WITH MAN AND BIKE**

## VI.CONCLUSION

The designed and fabricate the speed breaker and test and performance is tested and the amount of current according load and various parameters is calculated. All the data is given in table respectively. The power speed breaker helps to produce electricity which can be used to light the street lamp. Hence it helps to save conventional source of energy like coal, petroleum and natural gas which are becoming extinct day by day. Thus it is producing energy from alternate source which is non-polluting and environment friendly.

## REFERENCES

1. Babu T.A., Sharmila V., "Cefotaxime-induced near-fatal anaphylaxis in a neonate: A case report and review of literature", Indian Journal of Pharmacology, ISSN : 0253-7613, 43(5) (2011) pp.611-612.
2. Valiathan G.M., Thenumgal S.J., Jayaraman B., Palaniyandi A., Ramkumar H., Jayakumar K., Bhaskaran S., Ramanathan A., "Common docking domain mutation e322k of the erk2 gene is infrequent in oral squamous cell carcinomas", Asian Pacific Journal of Cancer Prevention, ISSN : 1513-7368, 13(12) (2012) pp.6155-6157.
3. Mani Sundar N., Krishnan V., Krishnaraj S., Hemalatha V.T., Alam M.N., 'Comparison of the salivary and the serum nitric oxide levels in chronic and aggressive periodontitis: A biochemical study", Journal of Clinical and Diagnostic Research, ISSN : 0973 - 709X, 7(6) (2013) pp.1223-1227.
4. Thirunavukkarasu A.B., Chandrasekaran V., 'Efficacy of anti-scorpion venom serum over prazosin in severe scorpion envenomation: Is the current evidence enough", Journal of Postgraduate Medicine, ISSN : 0022-3859, 57(1) (2011) pp.83-84.
5. Subbaraj G.K., Kulanthaivel L., Rajendran R., Veerabathiran R., "Ethanol extract of Carum carvi (EECC) prevents N-nitrosodiethylamine induced phenobarbital promoted hepatocarcinogenesis by modulating antioxidant enzymes", International Journal of Pharmacy and Pharmaceutical Sciences, ISSN : 0975 - 1491, 5(S1) (2013) pp.195-199.
6. Ms.P.Thamarai #1, Mr.B.Karthik, Network Data Security Using FPGA, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN (Online): 2278 – 8875,pp 8318-8323, Vol. 3, Issue 4, April 2014
7. P.Thamarai, B.Karthik, ARM Based Automatic Meteorological Data Acquisition System, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN (Online): 2278 – 8875,pp 6525-6529, Vol. 3, Issue 1, January 2014
8. E.Kanniga, Dr.M.Sundararajan, Design And Modeling Of Bio Signal Amplifier For Signal Extractor Neuro feedback Interface Machine,International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering,ISSN: 2278 – 8875,pp 1717-1725,Vol. 2, Issue 5, May 2013
9. M.Bharathi, C.Selvakumar,Dynamic Modeling, Simulation and Control of MIMO Systems,International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering,ISSN 2278 - 8875, pp 71-84 ,Vol. 1, Issue 2, August 2012.
10. Sridhar Raja .D ,Periodic EBG Structure based UWB Band Pass Filter ,International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN: 2278 – 8875 , pp 1682-1686 ,Vol. 2, Issue 5, May 2013.