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Using Road Speed Breakers to Extract Electric Power

M. Mari Durai
UG Student
Department of Environmental Engineering
Park College of Technology
Coimbatore-641659, Tamil Nadu

***Abstract*--Now, the world is looking for alternating energy resources. Hence, it is necessary to encourage and give emphasis to the research and development tricks covering a broad spectrum of possible renewable resources, as their contributions are substantial. Renewable Energy sources are not tired. These resources are quickly renewed through natural process. It can't create any environmental pollution troubles. A revolutionary method of power generation through speed breaker power generators is proposed as an innovative and useful concept. The main advantage of using renewable resource is it is available throughout the year. By a onetime investment we can drew energy for many decades without affecting the environment. Successful accomplishment of renewable energy sources our country economy is increased.**

Keywords: pollution, Environmental, Renewable energy, wind, solar, speed breakers

I.INTRODUCTION

Power sector is one of the key sectors contributing extensively to the growth of countries Economy. Power sector needs a more useful role to be played in major, formulating and implementing the research projects with close involvement of all utilities such that the advantage reaches the ultimate Consumer. Power sector being highly technologies intensive, Research and improvement plays a major role in its Developmental plans and to find solutions for the problems existing in the power systems [1]. A Country largely depends on the thermal power generation and a right fuel mix, based on well-diversified portfolio of indigenous and imported fuel would be required. Another advantage using renewable resources (As Show in Fig 1) is that they are distributed over a wide geographical area, ensuring that developing regions have access to electricity production at a stable cost for the long-term future [10]. This is not the case with fossil fuels in exacting petroleum products.

The increase in energy consumption, particularly in the past several decades, has raised fears of wearing the globes reserves of petroleum and other resources in the future [8]. The huge consumption of fossil fuels has caused visible injure to the environment in various forms. Every year human activity dumps roughly 8 billion metric tons of carbon keen on the atmosphere, 6.5 billion tons from fossil fuels and 1.5 billion from deforestation [2]. It creates lot of environment difficulty and finally our ecological cycle will be affected. The energy industry needs to get more from existing fields while enduring to search for new resources. Due to technological advancement vehicles are made with improved fuel effectiveness and also perfect hybrid vehicle are made [3]. Also the improvements are needed so that wind, solar and hydrogen can be on stage more valuable sources in the energy field. The (As Shown in Table 1&2) worldwide largest offerings to current energy sources. At present so many alternative fuels have been developed, still they are able to meet only a small percentage of our actual demand [4]. Lack of adequate technology and Economical consideration to crap and store up the renewable energies when they are in abundant supply is the area where we have to concentrate much. The different kind of renewable energy produced in different country but its having the some disadvantage like wind mills runs at wind speed 30 km/h only and solar panel is more cost. So, in this paper proposal made to using road speed breakers piston assembly system with the help of gears to run the D.C motors to produced renewable energy without any environmental pollution [11].

II.AVAILABILITY OF RENEWABLE ENERGY RESOURCES

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Renewable Energy sources are not exhausted, and it is distributed over a wide geographical area, these resources are quickly renewed through natural development. It won't create any environmental contamination troubles [7]. The main advantage of using renewable resource is it is available the whole time the year. By a onetime investment we can drew energy for many decades without affecting the environment.

A. Solar Energy

Solar Energy has the greatest potential for providing clean, safe, and reliable power. The solar energy falling on the Earths continents is more than 200 times the total annual commercial energy currently being used by humans. The government started solar power adoption with subsidies (As Shown in Fig 2). A consumer who installs a solar panel array on a house can sell surplus energy to the local utilities. The solar panel cost, reduced to 50%, which would make solar Powered Electricity cost comparable with other types of fuel, is possible within the next decade. Solar Energy can be classified as two types 1.Passive solar and 2. Active solar Passive solar energy is making direct and indirect use of thermal energies from the sun. Indirect use of Energy is possible only in building (or) structures [5]. A southern exposure of a building guarantees the maximum exposure of the sun's rays. Special metal leaf covering over windows and roofs can block out the sun during the summer months. Special thermal solar collectors can circulate water through the collection unit that collect the sun's thermal energy for the purpose of heating the water for use. Active Solar Energy is the use of the sun's Electromagnetic radiation in generating Electrical Energy. Generally semi-conductor silicon Boron solar chips are used for this. The problem of these chips one that they have low Efficiency ratio and can only be used in supplying Energy needs of small devices (i.e. calculators, watches, radio etc.)

FIG 2: solar energy

B. Wind Energy

Wind, ultimately driven by atmospheric air, is just another way of collecting Energy. Sun also heats the atmosphere, which produces wind. It works on cloudy days and Rainy season also. The location of wind turbines is a very important factor, which influences the performance of the machine. The windmills are generally located at the top of a tower to heights approximately 30 m [6]. To avoid turbulence from one turbine affecting the wind flow at others it is located at 5-15 times blades diameter. Windmills are working both in horizontal axis and vertical axis. The basic mechanics of the two systems are similar. Wind passing over the blades is converted in to mechanical power, which is fed through transmission to an electrical generator (As Shown in Fig 3). Wind turbines will not work in winds below 13 km an hour. They work best where the wind speed averages 22 km an hour. The majority of wind turbines produced at the present time is horizontal axis turbine with three blades, 15-30 m diameter, producing 50-350 kW of Electricity [18]. Wind energy produces no air or water pollution, involves no toxic or hazardous substances, and poses no threat to public safety.

S.No.	Sources	Available in (%)
1	Oil	31
2	Coal	26
3	Natural Gas	19
4	Hydro Electricity	6
5	Firewood & Crop waste	12

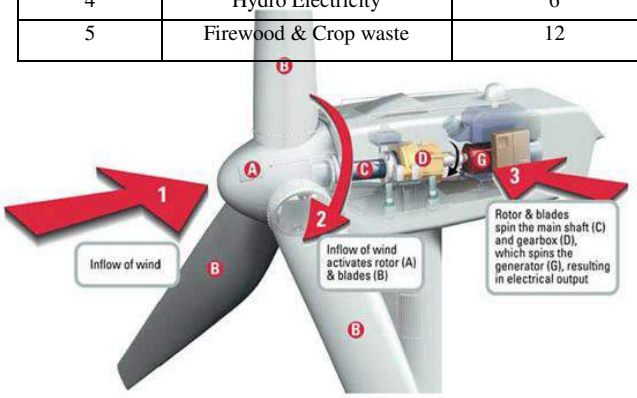

FIG 3: Wind Energy

Table 1: Worldwide largest contributions of Energy resources

C. Biomass Energy

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Biomass is the most important source for energy productions supplied by agriculture. Effective harnessing of bio-energy can energize entire rural milieu in a country like India where nature offers various types of biomass. This energy is also available in the form of biodegradable waste, which is the rejected component of available biomass. Biomass energy refers to fuels made from plants and animal wastes. The Biomass resource is organic matter in which the energy of sunlight is stored in chemical bonds [9]. When the bonds between carbon, hydrogen and oxygen molecules are broken by digestion, combustion (or) decomposition these substances release stored energy. Biomass energy is generated when organic matter is converted to Energy. In alcohol fermentation, the starch in organic matter is converted to sugar by heating. This sugar is then fermented and finally ethanol is distiller and then blended with another fuel. An aerobic digestion converts biomass, especially waste product such as municipal solid waste and market waste. In this process, the facultative bacteria breakdown the organic material in the absence of oxygen and produce methane and carbon dioxide. Bioconversion is a non-polluting, environmentally feasible and cost effective process. The effluent and digester residues are rich in nitrogen and phosphorus, which can be recycled back to the soil as a fertilizer [17]. By using this method we can derive 70% of the energy. The biomass is mixed with water and stored in an airtight tank.

D. Tidal Power

Oceans cover Two Thirds of the Earth's surface. This water is vast reservoir of renewable energy. India is naturally located in seashore side and covered 3 sides by sea. The movement of the water at the coastal front in kinetic energy that can be converted into Electrical energy. The energy spread out along the thousand of km of coasts, in favorable location, the energy density can average 65 MW/mile of coastline an amount which can lead to economical wave generated Electricity. The cheapest method to draw tidal power is that the oscillating water columns use the force of waves entering a fixed device to generate Electricity [16]. The waves entering the anchored compress air in a vertical pipe. This compressed air can be used to simply derive a turbine generator producing Electricity. The main problem of wave power plants is cyclone and severe storms. During this period the plant is not working.

Table 2: New and Renewable sources in India

S.No.	Sources	Potential	Achievement
1.	Wind	45,000	2980
2.	Hydro Power Plant	15,000	1700
3.	Biomass Power	19,500	750
4.	Solar Panel	20 mw/km ^{2}	2mw/km ^{2}
5.	Waste to Energy	1700 mw	50 mw

III.NAME OF THE COMPONENTS

Table: 3 Components are used in the generation of electricity

S.No.	Name of the Component
1	Speed Breaker
2	Connecting Rod
3	Crank Shaft
4	Spur Gears
5	D.C. Generator
6	Battery
7	Inverter

A. Speed Breaker

Speed bumps (or speed breakers) are the common name for a family of traffic calming devices that use vertical deflection to slow motor-vehicle traffic in order to improve safety conditions. Variations include the speed hump (or speed ramp), speed cushion, and speed table [15].

B. Connecting Rod

In a reciprocating piston engine, the connecting rod connects the piston to the crank or crankshaft. Together with the crank, they form a simple mechanism that converts reciprocating motion into rotating motion [14]. Connecting rods may also convert rotating motion into reciprocating motion.

C. Crank Shaft Mechanism

The crankshaft is a mechanism that transforms rotary movement in to linear movement, or vice versa. For example, the motion of the pistons in the engine of a car is linear (they go up and down).But the motion of the wheels has to be rotary. So, engineers put a crankshaft between the engine and the transmission to the wheels. The pistons of the engine move the crankshaft and the movement becomes rotary [12]. Then the rotary movement goes past the clutch and the gear box all the way to the wheels.

D. Spur gear

Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with teeth projecting radically. Though the teeth are not straight-sided

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(but usually of special form to achieve a constant drive ratio, mainly in volute but less commonly cycloidal), the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears mesh together correctly only if fitted to parallel shafts [19]. No axial thrust is created by the tooth loads. Spur gears are excellent at moderate speeds but tend to be noisy at high speeds.

E. D.C Generator

It is a device, which converts mechanical energy into electrical energy [20]. The generator uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faraday's law of electromagnetic induction.

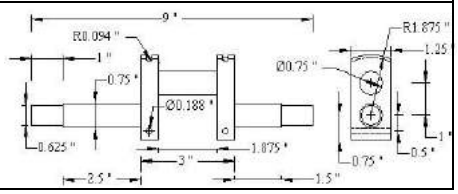
F. Battery

Battery (electricity), electrochemical cells that transform chemical energy into electricity

G. Power Inverter

A power inverter, or inverter, is an electronic device or circuitry that changes direct current (DC) to alternating current (AC). The input voltage, output voltage and frequency, and overall power handling depend on the design of the specific device or circuitry [13]. The inverter does not produce any power; the power is provided by the DC source. A power inverter can be entirely electronic or may be a combination of mechanical effects (such as a rotary apparatus) and electronic circuitry. Static inverters do not use moving parts in the conversion process (as shown in Table 3 & 4).

Table: 4 Components List with Their Specification

S.No.	Name of the Component	Specification
1	Speed Breaker	(i) Height : 100mm (ii) Breath : 1m (iii) Length: Based on the Type of Road
2	Connecting Rod	(i) Length: 200mm (ii) Top Diameter: 40mm (iii) Bottom Diameter: 80mm
3	Crank Shaft	
4	Spur Gears	(i) Material : Mild Steel (ii) No. of teeth : 56(big gear) (iii) No. of teeth : 18(small gear) (iv) Type: Spur gear (v) No.of gear used:2
5	Motor	(i) Voltage : 12V (ii) Type: D.C. Generator (iii) RPM: 1200rpm
6	Battery	(i) Model: 2M-12200 (ii) Voltage: 12V (iii) Capacity: 200.Ah
7	Inverter	(i) Model: PS 300-24 (ii) Input (Vdc): 12V (11-14,5Vdc) (iii) Output (Vac): 230Vac-50Hz

IV.PRINCIPLE OF WORKING

The principle of the electric power generation using speed breaker mechanism is very simple. It is based on the same principle as in the case of electricity generation in case of hydroelectric power plant, thermal electric power plant, nuclear power plant, geothermal energy, wind energy, tidal energy etc. In all of the above power plant mechanical energy is converted into electrical energy. In this setup also mechanical energy is converted into electrical power using a D.C. generator. Here the vertical motion of the top of the speed breaker is converted into the rotational motion, which in turn rotates the generator and generates electricity.

V. PROPOSED IDEA

In this paper proposal made to produced renewable energy Using road speed breaker assembly system using crankshaft to converted reciprocating motion converted into rotating motion and using gears assembly to run the D.C motors to produce electricity. The piston assembly parts consist of speed breaker, crankshaft, connecting rod, gears, and D.C motors (As shown in Fig 4).

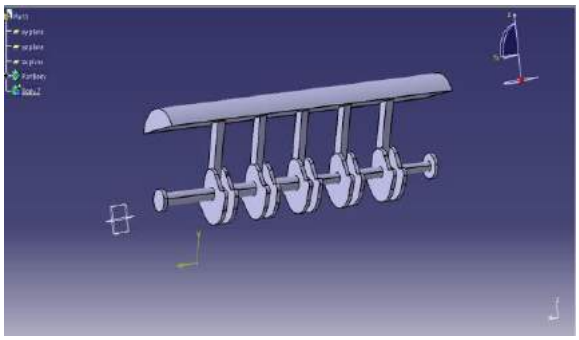


Fig4: piston assembly CATIA model

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The speed breaker goes on up and downward motion and crankshaft converted in to reciprocating motion is converted into rotating motion through connected turbine unit to run the turbine to produce electricity without any environmental pollutions (As shown in Fig 5).

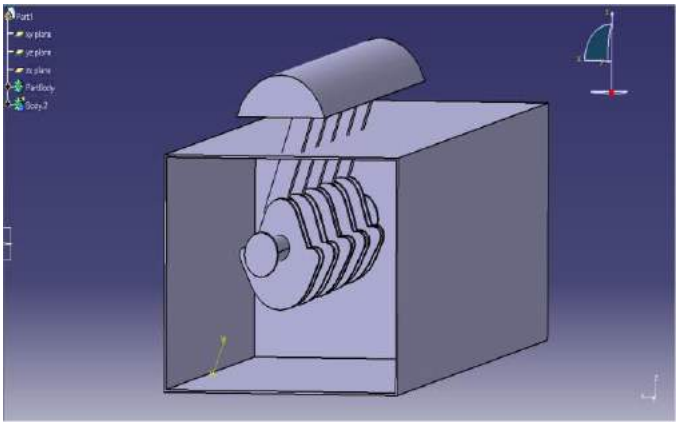

Fig5: working assembly in CATIA model

VI. MATHEMATICS

Let us consider

The mass of any vehicle travelling over the speed breaker= 1000Kg (Approximately)

Height of speed brake = 10 cm

Work done = weight of the body x distance travelled by the vehicle

Here,

Gravity = 9.81m/s^2

Weight of the Body = 1000 Kg x 9.81 = 9810 N

Distance traveled by the body = Height of the speed breaker =10cm

Power = Work done/Second = (9810 x 0.10)/60 = 16.35 Watts

Output Power developed for 1 vehicle passing over the speed

Breaker arrangement for one minute (60 seconds) = 16.35 watts

Power developed for 1 hour (60 minutes) = 981 watts

Power developed for 1 day (24 hours) = 23.544 Kilowatts

Power developed for 1 year (365 days* 24) = 206.24544 Megawatts (As Shown in Table 5)

Table: 5 Powers Developed From Speed Breaker in Different Load Condition

S. No	Load (Kg)	Mass (N)	Power (Watts)	1minute (Watts)	1Hour (Watts)	1Day (Kilowatts)	1year (Megawatts)
1	50	490.5	0.8175	49.05	2943	70632	25780680
2	100	981	1.635	98.1	5886	141264	51561360
3	300	2943	4.905	294.3	17658	423792	154684080
4	700	6867	11.445	686.7	41202	988848	360929520
5	1000	9810	16.35	981	58860	1412640	515613600
6	3000	29430	49.05	2943	17658	423792 0	154684080

VII. ECONOMICAL BENEFITS

Problems with renewable energy sources are non-availability at a reasonable cost, limited supplies and lack of cost Effective means for capturing and concentrating the renewable Energy. By Effective steps to eliminate the importing of fossil fuel (oil and Natural gases) can be minimized the country's economy will increase. The production cost of renewable source is reduced by subsidies. For some years, the World Bank has been sold Electricity in developing countries at an average only 40% of the cost of its production. The government by introducing subsidies in the form of relaxing duties, taxes and installation charges, the prices can be drastically reduced and it will came equal to fossil fuel rate.

VIII. CONCLUSION

The renewable sources are cost effective, user-friendly, more efficiency. By promoting renewable energy sources we can avoid, Air pollution, soil pollution and water pollution. Country's Economy will increase. So, our proposed idea comes under renewable energy resources produced throughout the year without affecting the Environment.

IX. REFERENCE

[1]. Ashokverghese , New and Renewable Energy Resources, Proceedings of International conference on Alternate Energy resources, Asian Institute of Technology, Thailand , pp 403 - 410

[2]. Malkivia – pyh I.G and Pyh Y.A, 2002, Sustainable energy Resources, Technology and Planning, WIT Press, Boston.

[3]. Booth, D.E, 1998, the environmental consequences of Growth, London and New York,

[4]. Cline, W.R., 1992, The Economics of global warming, Washington D.C.

[5]. Gibbons, J.H, et.al, 1989, Strategies for energy use, vol. 261, PP 136-143.

[6]. National Geographic Magazine, pp. 35-40, August 2005.

[7]. N. Khaleefah and S. Jabir, "The use of solid waste to produce energy," Proceed Conference of Planning, Dohok & Dortmund University, pp. 12-15, 2012.

[8]. B. Venkataraman, D. Elango, "renewable energy sources" Professor, Department of Automobile Engg., Hindustan College of Engg., Padur-603 103, Tamil Nadu.

[9]. Nisha Sriram, Member, IEEE and Mohammad Shahidehpour, Fellow, IEEE Electric Power and Power Electronics Center "Renewable Biomass Energy", Illinois Institute of Technology Chicago, Illinois 60616.

[10]. Tanmay Mazumder, "Electricity Generation by Hump (Speed Breaker) Arrangement on Road", powersector, energetica india

[11]. Abhishek Gupta, Nikita Mittal, Pushpendra Pal Singh, Ram Arora, Ramkishan Dhakar, Purab Chand, Piyush Mangal, "Electricity Generation from Speed Breakers", International Journal of Electrical and Electronics Research ISSN 2348-6988 (online) Vol. 4, Issue 1, pp: (135-139), Month: January - March 2016, www.researchpublish.com

[13]. Piyush Bhagdikar, Shubham Gupta, Navneet Rana, R. Jegadeeshwaran, "generation of electricity with the use of speed breakers",International Journal of Advances in Engineering & Technology, May, 2014. ©IJAET ISSN: 22311963

[14]. B. Santosh Sarma, V. Jyothi, D. Sudhir, "Design of Power Generation Unit Using Roller Mechanism", IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) e-ISSN: 2278-1676,p-ISSN: 2320-3331, Volume 9, Issue 3 Ver. I (May – Jun. 2014), PP 55-60 www.iosrjournals.org.

[15]. Akshay Tank, Prof. Chandni, V. Shah Keyur Shah, "Eco-Friendly Energy Generation through Speed Breaker",International Journal of Engineering Development and Research (www.ijedr.org), 2014 IJEDR | Volume 2, Issue 1 | ISSN: 2321-9939, IJEDR1401219.

[16]. Dave Jaymin J, "Power Generation from Speed Breakers by Air Compression Method", International Journal of Engineering Development and Research, (www.ijedr.org) , 2015 IJEDR | Volume 3, Issue 2 | ISSN: 2321-9939, IJEDR1502015

[17]. Amanpreet Kaur, Shivansh Kumar Singh, Rajnees, Parwez, Shashank, "Power Generation Using Speed Breaker with Auto Street Light", International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 2, March 2013, ISSN: 2319-5967

[18]. Ch.Bhanu Prakash, A.V.Ramana Rao, P.Srinuvas, "Road Power Generation by Speed Breaker", International Journal of Engineering Trends and Technology (IJETT) – Volume 11 Number 2 - May 2014, ISSN: 2231-5381, http://www.ijettjournal.org

[19]. M.Sailaja, M. Raja Roy, S. Phani Kumar, "Design of Rack and Pinion Mechanism for Power Generation at Speed Breakers", International Journal of Engineering Trends and Technology (IJETT) – Volume 22 Number 8-April 2015, ISSN: 2231-5381, http://www.ijettjournal.org.

[20]. Yogita D. Patil, Dr. G S Mundada, " Alternate Energy from Busy Road for Development of Smart City", international journal of innovative research in electrical, electronics, instrumentation and control engineering Vol. 4, Issue 2, February 2016, ISSN (Online) 2321 – 2004 ISSN (Print) 2321 – 5526, DOI 10.17148/IJIREEICE.2016.4228.

[21]. B. Aravind Reddy, T.Venkata Sahaj, Yarram Arun Kumar, D.Ramana Reddy, "modified design of speed breaker for power generation", IJRET: International Journal of Research in Engineering and Technology, eISSN: 2319-1163 | pISSN: 2321-7308, Volume: 04 Special Issue 02 | NCIRET-2015 | Apr-2015, Available @ http://www.ijret.org.

[22]. Miss. Shraddha Deshpande , Miss. Bhagyashri Kulkarni , Prof. Aashish Joshi, "Electricity Generation Using Speed Breaker", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395 -0056 p-ISSN: 2395-0072, Volume: 03 Issue: 02 | Feb-2016, www.irjet.net

[23]. Mohsen Partodezfoli, Abbas Rezaey, Zahra Baniasad, Horieh Rezaey, "A Novel Speed-Breaker for Electrical Energy Generation Suitable for Elimination of Remote Parts of Power Systems where is Near to Roads", J. Basic. Appl. Sci. Res., 2(6) 6285-6292, 2012, © 2012, TextRoad Publication, ISSN 2090-4304, Journal of Basic and Applied Scientific Research, www.textroad.com

[24]. K.Saicharan Teja, K.Sandeep Reddy, K.Anil Kumar, K.Varun Raj, V. Venkata Phani Babu, "Power Generation through Speed Breakers", International Journal & Magazine of Engineerin, Technology, Management and Research, ISSN No: 2348-4845, Volume No: 3(2016),Issue No: 5(May), www.ijmetmr.com.

[25]. Pankaj D. Jagtap, Sanket D. Pardeshi, Angad G. Khade, Varun Sathe, "A Review: Comparison of different Mechanisms for Electricity Generation using Speed Breaker", Multidisciplinary Journal of Research in Engineering and technology,ISSN: 2348-6953, M17-1-2-7-2014, www.mjret.in

[26]. Hasan Qureshi, Amir Shaikh, Fareed Mansuri, Prajyot Wade, "Energy Generation from Speed Breaker", International Journal of

Research in Advent Technology, Vol.4, No.3, March 2016, E-ISSN: 2321-9637, www.ijrat.org

[27]. A.Padma Rao, A.Kiran Kumar and S.Suresh, "Power Generation from Speed Breaker by Rack and Ratchet Mechanism", International Journal of Current Engineering and Technology, E-ISSN 2277 – 4106, P-ISSN 2347 - 5161 , ©2014 INPRESSCO, http://inpressco.com/category/ijcet

[28]. Amod Kumar Pandey, Somya Yadav, Tanu Srivastava, "Electrifying Roller-Coaster Ride through Speed Breakers", International Journal of Computer Applications (0975 – 8887), Volume 67– No.21, April 2013

[29]. K.Ravivarma, B.Divya, C.P.Prajith, A.Sivamurugan, K.Vengatesan, "Power Generation Using Hydraulic Mechanism at Speed bumper", International Journal of Scientific & Engineering Research, Volume 4, Issue 6, June-2013, ISSN 2229-5518, IJSER © 2013, http://www.ijser.org

[30]. Rajat Gupta*, Suyash Sharma*, Saurabh Gaykawad, "A Revolutionary Technique of Power Generation through Speed Breaker Power Generators", International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 8, August – 2013, ISSN: 2278-0181, IJERTV2IS80596, www.ijert.org