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ENERGY REGENERATION BY USING PIEZOELECTRIC PLATES(SENSORS) IN EFFICYCLE

Chaudhari Kalpesh[1], Chewale Avinash[2], Gangurde Siddhant[3], Dr. S.N. Shelke[4]

[1]Chaudhari Kalpesh , Dept. of Mechanical Engineering , SVIT, Nashik, Maharashtra, India
[2]Chewale Avinash, Dept. of Mechanical Engineering , SVIT, Nashik, Maharashtra, India
[3]Gangurde Siddhant, Dept. of Mechanical Engineering , SVIT, Nashik, Maharashtra, India
[4]Dr. S.N. Shelke ,Head of Dept. of Mechanical Engineering, SVIT, Nashik, Maharashtra, India

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Abstract – *In day todays life the Regeneration and utilization of power turns to be necessary for each work for saving time and money. Every mechanical device or component has a specific pressure energy by the virtue of weight which is transferred to the other small supporting structure. This paper contains by using piezoelectric plates, utilization of pressure energy into regenerative power which is produced by 'EFFICYCLE' on its wheels. The piezoelectric plates uses the features of variable deformation in the shape of the plate. The surface of the tyre could be the best place to mounted the piezoelectric plate, so the every time the tyre touches the surface it gets deformed and the energy gets produced. The power or electricity produced by this technique can be stored in the battery and used it for the additional lights, automatic transmission of efficycle.*

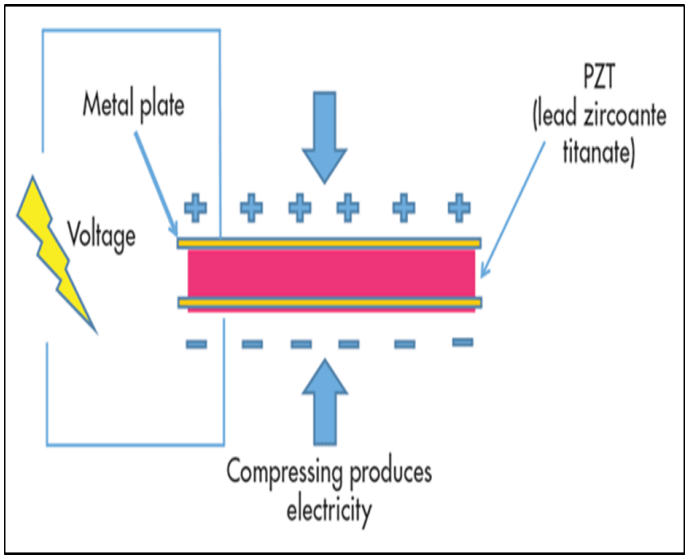
Key Words: **Piezoelectric sensor, Battery, Efficycle, variable deformation**

1. INTRODUCTION

In the area of decreasing amount of fossils fuels and environmental degradation and increasing pollution an electric vehicles is in demand for an replacement to internal combustion fuel driven vehicles. Many sectors/factories uses electric vehicle for material transportation and material handling within industry so in order to make electric vehicle more efficient we need to incorporate energy regenerative device/system ,The precious energy we use some purpose can be recycled and hence can be used again ,so as a result the efficiency of the system increases ,it also has many advantages such cost reduction ,material reduction ,efficient processing etc.to increase the efficiency of any system we regenerates the power which nothing but the energy regeneration is doing customization in system and regenerating power source which required to drive the system. It is time to find renewable surceases of energy for the future. Piezoelectric materials are being more and more studied as they turn out to be very unusual materials with very specific and interesting properties. In fact, there materials have the ability to produce electrical energy from mechanical energy for example they can convert mechanical behavior like vibrations in to electricity. Such devices are commonly referred to as energy harvesters and can be used in applications where outside power is unavailable and batteries are not a feasible option. While recent experiments have shown that these materials could be used as power generators.

1.1 Why Piezoelectric sensors

Common chemical composition of piezoelectric material includes Common piezoelectric man-made ceramics include **barium titanate**, **lead** titanate and **lead zirconate titanate**, the most common piezoelectric **ceramic** in use. Other naturally-occurring piezoelectric materials include dry bone, tendons, silk, some woods, enamel, dentin and collagen. Piezoelectric materials have two properties that are define as direct and converse effect. Direct effect is the property of some materials to develop electric change on their surface when mechanical stress is exerted on them, while converse effect is the property of some materials to develop mechanical stress when an electric charge is induced.



Piezoelectric plates or sensors introduced with the two poles which are positive and negative. When mechanical stress applied on it, this sensors develops free electrons which produces a electricity for future use.

1.2 WORKING AND OVERVIEW

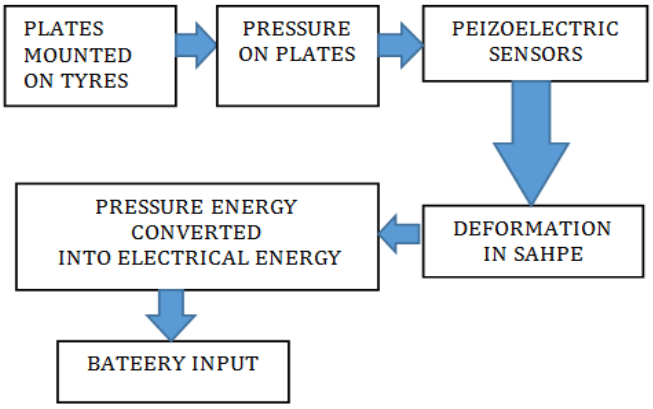


Fig1: Block diagram of regeneration using piezoelectric plates in efficycle.

In efficycle, because of deformation property of piezoelectric material we installed the piezoelectric sensor or plate on tyres which is continuously moving part in the system.when we drive the efficycle manually plates are in contact with some mechanical stress or load. Whole systems load applied on the plates when the system is in motion. pressure energy of the efficycle get converted into electric energy having the free electros produce on the plates. But the voltage produce by the plates is DC voltage,to convert it in AC voltage we installed one transducer in the system.

2. Piezoelectric switch

The voltage generated due to a single on pulse, produced by the pressure applied to the piezo switch can be varied by varying the amount of pressure. If the pressure applied to the piezoelectric sensor switch is increased, then higher voltages can be generated, which take a long time for dissipation.

Fig 2 : Piezoelectric switch

These piezoelectric sensor switches are weatherproof as they are completely sealed from the environment. As, stainless steel is used for construction of piezo sensor switches, they can withstand the damage and are resistant to heavy use.

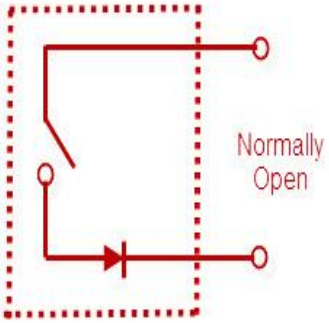


Fig 3 ; Piezo sensor equivalent circuit

These piezoelectric sensor switches are weatherproof as they are completely sealed from the environment. As, stainless steel is used for construction of piezo sensor switches, they can withstand the damage and are resistant to heavy use. Pressure is applied to the surface of the piezoelectric sensor switch that deflects about 2microns and this applied pressure is converted into an electrical signal by the piezoelectric crystal.

3. CONCLUSION

The maximum current, voltage and wattage, all parameters are depending on the type of piezoelectric material (Quartz, PZT, PMN-PT), size of the material. If we take the example of PZT, the maximum current can vary from nA to micro amp and the voltage generated in 1-100 V, depending upon the size of PZT. This chare can be stored in the battery after going through the suitable electronics.

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AUTHORS

Kalpesh Chaudhari
Mechanical Engineer,
Ex-Analysis Head Efficycle 2018
SVIT, Nashik

Avinash Chewale
Mechanical Engineer,
Ex-Fabrication Head Efficycle 2018
SVIT, Nashik

Siddhant Gangurde
Mechanical Engineer,
Ex-Regeneration Head Efficycle
2018, SVIT, Nashik

DR.S.N. Shelke
HOD-Mechanical Engineering
SVIT, Nashik