

# Design and Fabrication of Electricity Generating Shock Absorber

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**Abstract :** Road vehicles can expand a sign amount of energy in undesirable vertical motions that are induced by road bumps, and much of that is dissipated in conventional shock absorbers as they dampen the vertical motions. An electromagnetic linear generator and regenerative electromagnetic shock absorber is disclosed which converts variable frequency, repetitive intermittent linear displacement motion to useful electrical power.

As a regenerative shock absorber, the disclosed device is capable of converting parasitic displacement motion and vibrations encountered under normal urban driving conditions to a useful electrical energy for powering vehicles and accessories or charging batteries in electric and fossil fuel powered vehicles. The disclosed device is capable of high power generation capacity and energy conversion efficiency with minimal weight penalty for improved fuel efficiency.

## Introduction:

A shock absorber is a mechanical device designed to smooth out or damp sudden shock impulse and dissipate kinetic energy. It is analogous to a resistor in an electrical circuit. One design consideration, when designing or choosing a shock absorber is where that energy will go. In most dashpots, energy is converted to heat inside the viscous fluid. In hydraulic cylinders, the hydraulic fluid will heat up. In air cylinders, the hot air is usually exhausted to the atmosphere. In other types of dashpots, the dissipated energy can be stored and used later. Shock absorber are an important part of automobile and motorcycle suspensions, aircraft landing gear, and the supports for many industrial machines..

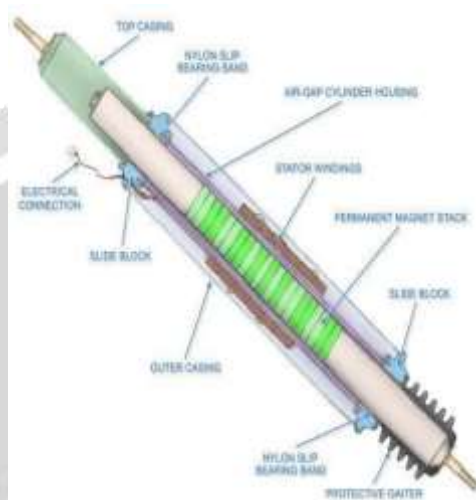
They may be mechanical (e.g. elastomeric or coil spring) or rely on a fluid (gas, air, hydraulic), which absorbs shock by allowing controlled flow from outer to inner chamber of a cylinder during piston actuation. In conventional shock absorbers the piston rod is typically returned to the unloaded position with a spring.

**Concept :** A conventional automotive shock absorber dampens suspension movement to produce controlled action that keeps the tire firmly on the road. This is

done by converting the kinetic energy into heat energy, which is then absorbed by the shocks oil. The Power-Generating Shock Absorber (PGSA) converts this kinetic energy into electricity instead of heat through the use of a Linear Motion Electromagnetic System (LMES). The LMES uses dense permanent magnet stack embedded in the main piston, a switchable series of stator coil windings, a rectifier, and an electronic control system to manage the varying electrical output and dampening load.

**Design Process :**

- Survey and define functional specifications (Requirements)
- Detailed engineering description (Includes engineering drawings related to final design of the vehicle)
- Conceptual and functional design (Includes numerical calculations, CAD. Analysis of final design of the vehicle)
- Manufacturing (parts machining and components purchase).
- Mechanical Assembly of Parts

**Working principle :**

The bottom shaft of the PGSA mounts to the moving suspension member and forces the magnet stack to reciprocate within the annular array of stator windings, producing alternating current electricity. That electricity is then converted into direct current through full wave rectifier and stored in the vehicle's batteries. The PGSA is the same basic size and shape, and mounts in the same way, as a standard shock absorber or strut cartridge.

**Components :**

- A. Conventional Shock Absorber
- B. Stator Winding
- C. Permanent Magnet
- D. Insulated Wires
- E. Electronic Control Unit:

**Future Of The Technology :**

The researchers are planning to increase the energy density and efficiency of the system. There is still room for improvement in the overall design of the regenerative system, and researchers are working on such improvement.

**Conclusion :**

Energy is an indirectly observed quantity, which cannot be created or destroyed, but any form of energy transform into another form. The power generated is directly proportional to magnetic flux across the area of the magnet used. The power increasing factor depends upon the road conditions, i.e., more power is generated when the 2 wheeler is on regular roads.

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