Efficient Kinetic Energy Recovery System for Vehicle

Vineet Rajesh Shriwas[1] Prof. Pratik H. Rathod[2]
[1]Student [2]Assistant Professor
[1,2]Department of Mechanical Engineering
[1,2]Jagadambha College of Engineering and Technology Yavatmal, Maharashtra, India

Abstract— KERS is generally used to accelerate the running power of the four wheel drive in respective to the engine speed. This system is generally works on energy absorption principal when then vehicle taking a turn as we known there was a frictional contact was occurred in between the four wheel drive and road surface hence the there will be large lost of kinetic energy which is then dissipated as a heat to the atmosphere to utilize this lost of kinetic energy this system is used which covert this lost of kinetic energy into vehicle acceleration.

Keywords: Energy, Acceleration, Reservoir, Efficiency

I. INTRODUCTION

KERS is the inbuilt system that helps to utilize waste heat and kinetic energy during deceleration is first converted into power then same energy is used to accelerate the vehicle at an instantaneous point hence works on principle on acceleration with retarding speed. It serves and provide a path to utilize waste heat means it also work for utilizing the illegally dissipating energy this device recover kinetic energy presented in the waste heat created by the vehicle generally during braking process. UP to 88 BHM for 8.8 sec or 500 KJ of waste in power was stored. KERS builders, Flybrid systems demonstrated a working F1 device at the auto sport international show. But many F1 teams opposed it at it was quiet expensive so it was banned in 2010 season. At 2011 North American International auto show ,Porsche 918 concept car which uses a flywheel based KERS.A motorcycle racing company KTM secretly tested this system in their vehicle but They were banned as that system was illegal and unstable for motorcycles.

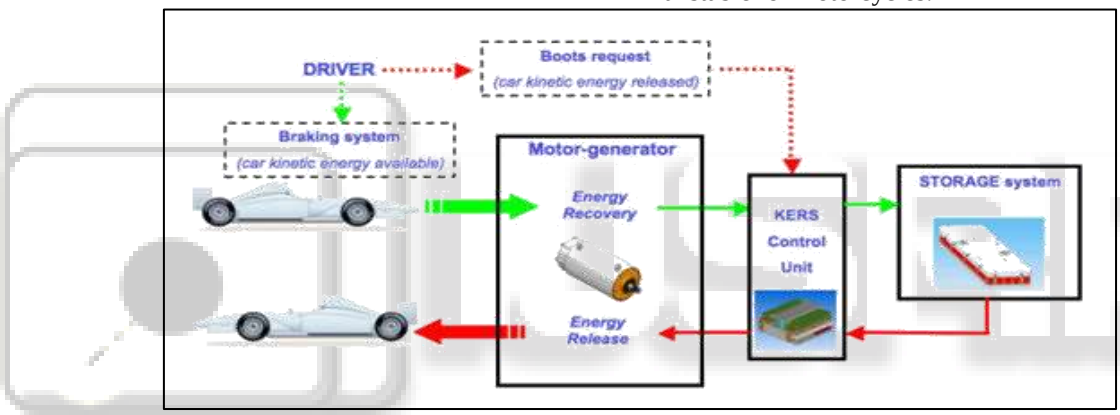

Fig. 1: Kinetic Energy Recovery System Block Diagram

II. WORKING PRINCIPLE

KERS is works on the principle that it stores the kinetic energy during deceleration of the vehicle and same lost of kinetic energy is then converted into power to accelerate the vehicle. Generally when the vehicle taking a turn a driver applies a break and kinetic energy is lost due to friction between the road surface and a wheel this lost of energy is used to boots vehicle speed. The standard KERS system works on the basis of two basic cycle charge cycle and boots cycle during charge cycle when the speed of the vehicle is reduces as it takes a turns an actuator unit absorb the waste heat from the rear brakes this stored energy is then passed through the central possessing unit and into storage unit. This units are positioned centrally to maintained the position, balancing and ground clearance of the vehicle.

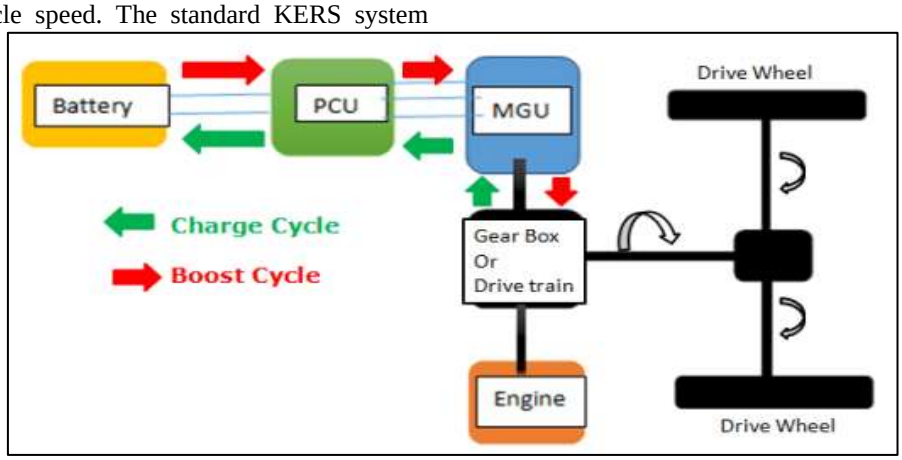

Fig. 2: working Principle

III. MECHANICAL KERS

The mechanical KERS is generally used the combination of flywheel, continuously variable transmission system (CVT), and a clutch connected to CVT. When the vehicle taking a turn or when the speed of the vehicle is reduces the clutch is disengaged and connected with the flywheel now the flywheel is rotate up to speed of 60000 rpm and stored near about 60-80 KW of energy now the clutch is separated from the flywheel and allow it to rotate as a single unit under this circumstances the flywheel has a stored energy of 60-80 KW this energy id then given to the rear wheel or front wheel as per the requirement of the drive and again the wheel speed is boots from an instantaneous point of the car as required. The mechanical KERS is works on the principle of regenerative braking as like an electrical motor is connected to the wheel drive it may be rear wheel or front wheel. Initially the motor drives the wheel by external sources and when the breaks are applied the motor shaft is rotate in opposite direction and acts as a generator and generate an electrical energy this generated electrical energy is then stored in the battery in the form of chemical energy and again supply back to the motor whenever there is the requirement is exist but while using this system there is continuous transfer of energy from electrical to chemical and from chemical to mechanical which may reduces the power up to 30 percent and using flywheel gives effective results over motor.

Electrical KERS often used motor generating unit, power control unit and a battery thence it is very cost effective as compared with mechanical kinetic energy recovery and if a take a look at there efficiencies then the electrical KERS is very effective then the mechanical KERS and if we consider design fixture of both then mechanical KERS is somewhat bulky then the electrical as the entire system is placed at the centre of the car body it helps to improve and maintained the balancing and ground clearance of the car body.

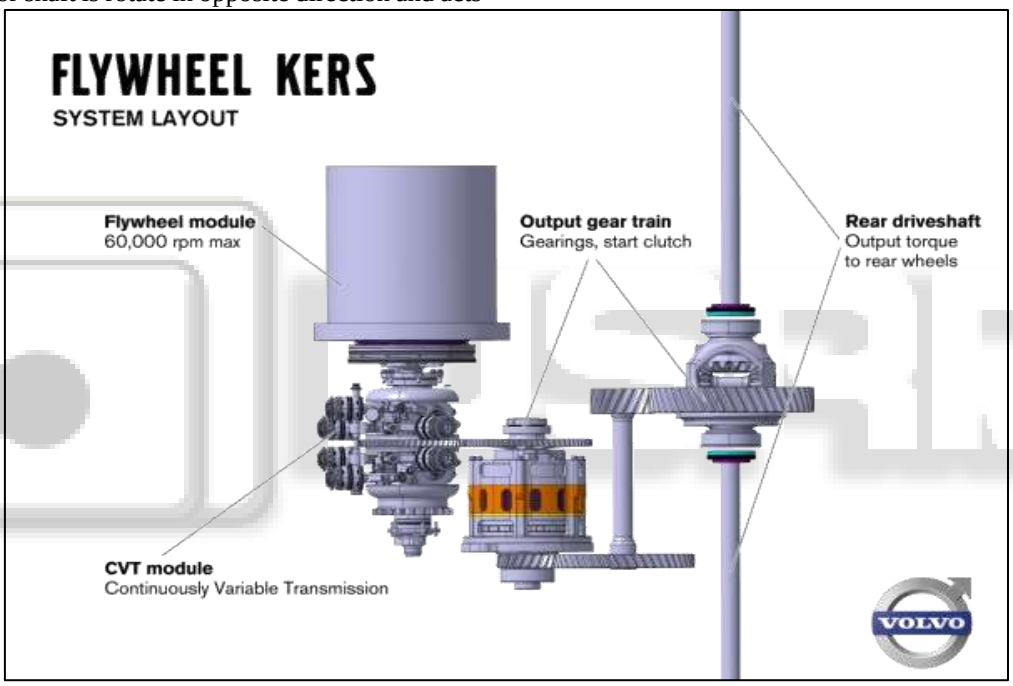

Fig. 3: Mechanical KERS

IV. ADVANTAGES

1) High power capability.
2) Good fuel economy.
3) Proper balancing and ground clearance to the vehicle.
4) Truly green solution.
5) Environment friendly with less pollution.
6) Effective utilization and recovery of waste energy.
7) Light weight and small size.
8) High efficiency storage and recovery.
9) Long system life up to 250000 kms.
10) Completely safe and ergonomically good.

V. CONCLUSION

Hence the kinetic energy recovery system is very efficient as it helps to utilizing waste heat and converting the same into acceleration in this way energy from the breaking system was utilized effectively and same is then used to boots its speed in this way it also helps to reduced the exhaust emission and fuel consumption is also reduced as the system is built up at the center of the vehicle frame the body balancing of the vehicle is also be maintained which helps to maintained the ground clearance of the vehicle.

REFERENCE

[1] Chibulka J., (2009), "Kinetic Energy Recovery System by means of Flywheel Energy Storage", Advanced Engineering Vol. 3, No. 1, pp. 27-38.
[2] Siddharth K. Patil, (2012), "Regenerative Braking System in Automobiles", International Journal of Research in Mechanical Engineering & Technology Vol. 2, pp 45-46.
[3] Ricardo Chicurel (2009), "A Compromise Solution for Energy Recovery in Vehicle Braking", International Journal of Research in Mechanical Engineering & Technology Vol.24, pp.1029-1034.

[4] Radhika Kapoor, C. MallikaParveen, (2013), Member of IAENG, "Comparative Study on Various KERS", Proceedings of The World Congress on Engineering, Vol.3, pp.152-160.
[5] Siddharth K. Patil, "Regenerative Braking System in Automobiles", ISSN: 2249-5762 (Online), IJRMET Vol. 2, Issue 2, May - Oct 2012.
[6] Radhika Kapoor, "Comparative Study on Various KERS", Proceedings of the World Congress on Engineering 2013 Vol. III, WCE 2013, July 3 - 5, 2013, London, U.K.
[7] Sharma P., Bhatti T.S., "A review on electrochemical double-layer capacitors," Energy Convers Manage, 2010.
[8] R. Johri, Z. Filipi, "Low-cost pathway to ultra efficiency car: series hydraulic hybrid system with optimized supervisory control," SAE 2009-24-0065, 2009.
[9] T. Lin, Q. Wang, B. Hu, W. Gong, "Research on the energy regeneration systems for hybrid hydraulic excavators," Automation in Construction, vol. 19, pp.1016–1026, 2010
[10] Karden E, Ploumen S, Fricke B, Miller T, Snyder K., "Energy storage devices for future hybrid electric vehicles," Journal of Power Sources, pp.2-11, 2007.

