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Kinetic Energy Recovery System

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Abstract: For the Formula One Race, one of the most important technical debuts is the Kinetic Energy Recovery Systems (KERS). The purpose of the Kinetic Energy Recovery System (KERS) is to both recover the kinetic energy of the moving vehicle while underbraking and to transform the typical loss of kinetic energy into a gain of kinetic energy. Cars lose a lot of kinetic energy when braking, which makes starting up very taxing. Here, we made use of a mechanical kinetic energy recovery system by allowing the wheel to retain energy that is typically lost during braking and releasing it to assist in starting the rider. Additionally, this might helpline increase the vehicle's fuel efficiency. Reusing the energy lost when braking is possible.

1 Introduction

The car's braking process. It stores that energyand when a car breaks, it dissipates a lot of kinetic energy as heat. The KERSstores this energy and converts this into power, upto 80 BHP for 6.67 sec or 400 kg. of energy can be Kinetic energy recovery system technology funnels the energy produced returning energy into the system through the braking action in the form of charging the battery for later usage. Friction is the primary cause of an automobile's energy waste. This friction must be broken in order to halt, yet the majority of the energy utilized when braking is typically squandered. A kinetic energy recovery system saves energy by transferring the energy that would otherwise be wasted during braking from the rotating axel to the generator and then to the battery.
Hybrids improve the efficiency of the system by managing the energy return.

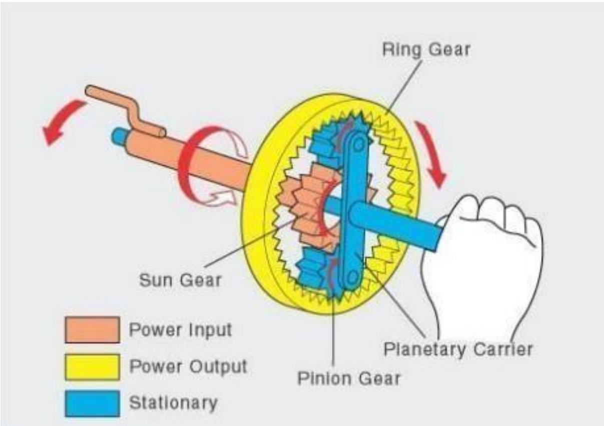
2 History

1. Developed in the 1990s. It was initially made known to the broader audience by the Formula One racing series in 2009.

2. KERS builders, Flybridge Systems demonstrated a working Formula One- spec device at the Autosport International show. (24kg, 400kj energy capacity, powerboost-60kw

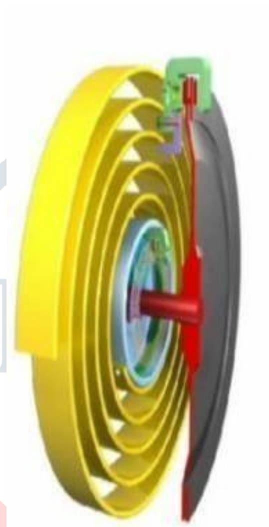
3. At the Autosport International exhibition, Flybridge Systems, the makers of KERS, displayed a functional gadget that meets Formula One specifications. (24 kg, 400 kJ of energy storage, 60 kW power increase)

4. However, because it was an expensive technology, many Formula One teams opposed it, and the 2010 season saw its ban.

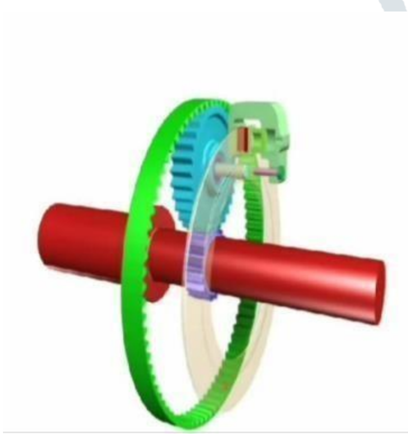


3 Components of KERS

The system consists of the wheel axle, planet gear, planet gear pin, sun gear fast end to the wheel axle, recovery ring, and disk brake placed downhole hub. The wheel hub rotates freely and the planet gear autorotates freely in between the recovery rings when the vehicle is moving. anthesis equipment



1. **Ringgearnegativespin**



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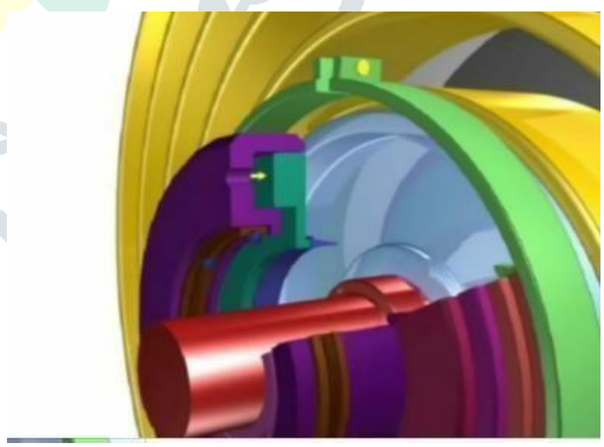


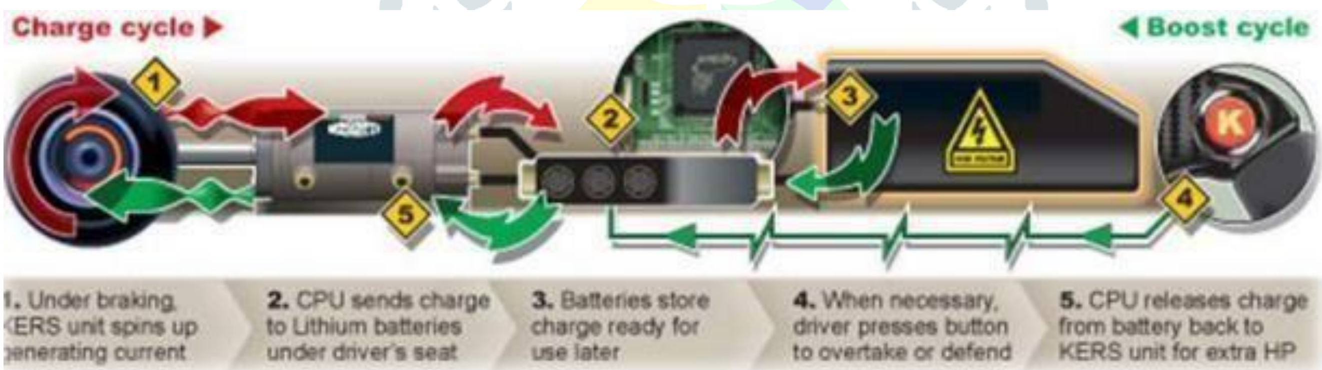
2. **Brakingandlockingofplanetcarrie**

1 Working Principles of KERS

Energy Recovery Systems, also known as KERS, operate on the fundamental tenet of physics, which is that "energy can be converted indefinitely, but it cannot be created or destroyed."

An automobile has kinetic energy when it is being driven, and this energy is transformed into heat energy when it brakes. During braking, the car's centrifugal force causes the vehicle to come to a halt, wasting some energy in the process. The same wasted energy is now stored in the automobile thanks to the KERS technology, and it is again transformed into kinetic energy when the driver applies the accelerator. F1 cars using the KERS technology have an additional 85 horsepower, under the rules. When a car is being driven it has kinetic energy and the same energy is converted into heat energy on braking. It is the rotational force of the car that comes to stop in case of braking and at that time some portion of the energy is also wasted. With the introduction of KERS system the same unused energy is stored in the car and when the driver presses the accelerator the stored energy again getsconverted to kinetic energy. According to the F1 regulations, the KERS system gives an extra 85 bhpto the F1 cars in less than seven seconds.

These systems take waste energy from the car's braking process, store it and then reuse it to temporarily boost engine power. This and the following diagram show the typical placement of the main components at the base of the fuel tank, and illustrate the system's basic functionality – a charging phase and a boost phase. In the chargingphase, kinetic energy from the rear brakes is captured by an electric alternator/motor controlled
by a central processing unit (CPU), which then charges the batteries in the boost phase, the electricalternator/motor



Electronic KERS

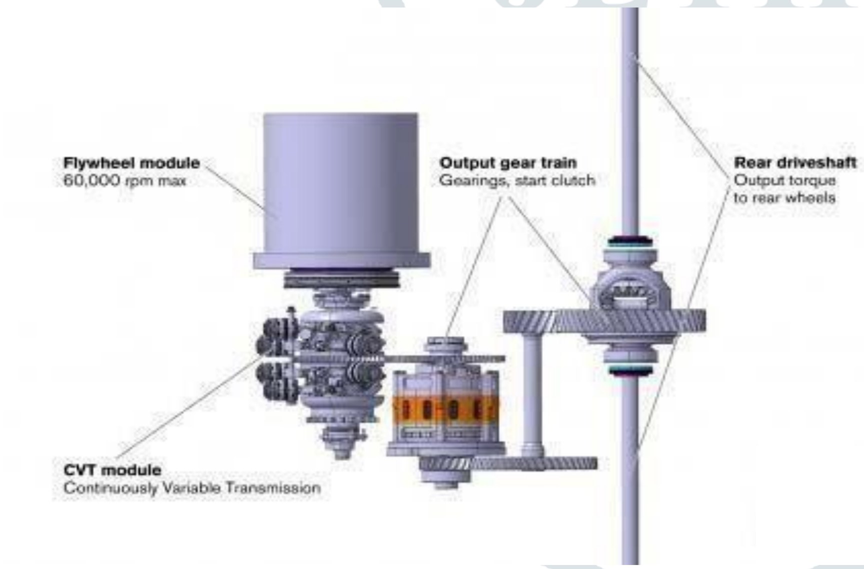
Red Bull, Toro Rosso, Ferrari, Renault, and Toyota all employ the same electronic KERS system, which is provided by the Italian company Magneti Marelli, in Formula One.

The main issue with this kind of KERS technology is that the lithium-ion battery overheats, necessitating the need for extra ducting inside the vehicle. To keep the system cool, BMW replaced the batteries with super-capacitors. With this setup, the electric motor at one end of the engine crankshaft captures a little amount of the kinetic energy or rotational force when the brake is applied to the vehicle. The electric motor's primary job is to charge the batteries while it is running and releases the same energy as it accelerates. After then, this electric motor transforms the kinetic energy into electrical energy that is further stored in the high voltage batteries. When the driver presses the accelerator electric energy stored in the batteries is used to drive the car.

Types of KERS

1.1 Mechanical KERS

Ian Foley invents the Electro-Mechanical KERS system. The entire system is built around a vacuum-sealed carbon flywheel that is connected to the differential via a CVT gearbox. This allows for the mechanical energy to be stored in a sizable storage reservoir, and the system has the benefit of not relying on the gearbox. The flywheel is turned by the braking energy, and the car's wheels are attached to the rotating flywheel when additional energy is needed. Power is increased, and racing performance is enhanced.



2 Limitations of KERS

1 Only one KERS for car which has only one braking system.

2. The KERS system's maximum input output power is 2-60 kilowatt.

3 The same electronic control unit must operate the recovery system.

4 Each wheel must receive the same torque if the KERS is linked between the differential and the wheel.

5. It is very costly. Engineers are trying hardto make it more cost effective.

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