REGENERATIVE BRAKING

A regenerative brake is an apparatus, a device or system which allows a vehicle to recapture and store part of the kinetic energy that would otherwise be 'lost' to heat when braking.

Braking systems

Electrical

Regenerative brakes are most commonly seen in electric or hybrid vehicles. Electric regenerative brakes descended from dynamic brakes (rheostatic brakes in the UK) which have been used on electric and diesel-electric locomotives and streetcars since the mid-20th century. In both systems, braking is accomplished by switching motors to act as generators that convert motion into electricity instead of electricity into motion. Traditional friction-based brakes must also be provided to be used when rapid, powerful braking is required.

Mechanism

Like conventional brakes, dynamic brakes convert energy to heat, but this is accomplished by passing the generated current through large banks of resistors that dissipate the energy. If designed appropriately, this heat can be used to warm the vehicle interior. When the energy is meant to be dissipated externally, largeradiator-like cowls can be employed to house the resistor banks.

Electric railway vehicles feed recaptured energy back into the grid, while road vehicles store it for re-acceleration using flywheels, batteries, or capacitors. It is estimated that regenerative braking systems currently see 31.3% efficiency; however, the actual efficiency depends on numerous factors, such as the state of charge of the battery, how many wheels are equipped to use the regenerative braking system, and whether the topology used is parallel or serial in nature.

It is usual (in railway use) to include a 'back-up' system such that friction braking is applied automatically if the connection to the power supply is lost. Special provision

also has to be made for if more power is being generated by braking than is being consumed by other vehicles on the system (again this is mainly a issue for d.c. traction on railways).

A small number of mountain railways have used 3-phase power supplies and 3-phase induction motors and have thus a near constant speed for all trains as the motors rotate with the supply frequency both when giving power or braking.

Hydraulic

This is a patented system currently in development by Permo-Drive, a small Australian company. It is designed to replace the current engine braking system on trucks and boasts better efficiency, less noise as well as other benefits over engine braking.

Mechanism

the system is working "in charge" when the gasoline cut-off is working.

a doubble clouch is better for Bypass the motor braking;

and the descharge is working based on a "needed torque"....

then, ALL the controll is based on the accelerator pedal, doesn't work at all whit brake-pedal !!

The mechanism is attached to the driveshaft of the vehicle and when brakes are applied feeds energy intohydraulic accumulators and is stored as hydraulic fluid under great pressure. The energy is then released again into the drive shaft when the vehicle is accelerating. This system is claimed to withhold up to 42.7% of the energy otherwise wasted in braking.

Disadvantages

The main disadvantage of regenerative brakes when compared with dynamic brakes is the need to closely match the electricity generated with the supply. With DC

supplies this requires the voltage to be closely controlled and it is only with the development of power electronics that it has been possible with AC supplies where the supply frequency must also be matched (this mainly applies to locomotives where an AC supply isrectified for DC motors).

Source : http://engineering.wikia.com/wiki/Regenerative_braking