

10 %, 30 %, 50 % and other quality substitute stones, and reed fibers are added to the concrete at the addition rate of 1–6 % of the cement mass, and the cube specimens of 40 mm × 40 mm × 160 mm are formed.

When shell and reed fiber are mixed with shell in a certain proportion, the crack resistance, impact resistance and mechanical properties of the cementitious material system can be improved, and the compressive and flexural strength of the concrete test block are greatly improved. The experiment shows that in the performance test of the specimen, the strength of the block does not decrease at 28 d, and the shell as an aggregate does not cause the reduction of the early strength of the concrete, which not only maintains the advantages of ordinary concrete, but also has the advantages of waste utilization, and will not affect the basic properties of the mortar. The microstructure test results show that the adhesion between the shell and the cement slurry is good, and the irregular shape of the shell significantly improves the distribution of the latter in the cement matrix, which fully shows that the shell is used as a fine aggregate, and even significantly enhances the workability of concrete compared with the traditional aggregate. Therefore, under the premise of reducing the consumption of primary aggregates and environmental protection, the use of shell aggregates does not affect the construction quality, and can significantly reduce the price of building materials. In addition, the flexural capriciousness of reed fiber can well improve the flexural strength of concrete, so the use of shell aggregate and reed can produce considerable social and economic benefits, and well realize the sustainable development of green building as the concept.

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A NEW FLYWHEEL ENERGY STORAGE DEVICE FOR CONVERTING POTENTIAL ENERGY INTO KINETIC ENERGY

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***Summary.** Generally, vehicles with axle structure do not use the gravitational potential energy of people and objects reasonably during transportation, but use the extra energy to make the vehicles operate. The purpose of this project is to study a flywheel energy storage device that converts potential energy into kinetic energy, so as to store gravitational potential energy and convert it into kinetic energy for output on demand, which is widely used in industry, civil transportation, medical rescue and other fields.*

With the rapid development of the times, the problem of insufficient energy supply has appeared all over the world. Under the background of the times, General Secretary Xi Jinping put forward the “double carbon” plan. Under the goal of carbon peaking and carbon neutralization, new energy will grow by leaps and bounds. In addition, the unique advantages of new energy technology

compared with traditional energy technology make it urgent to develop new energy and store energy. At present, common energy storage technologies include flywheel energy storage, pumping energy storage, compressed air energy storage, battery energy storage, heat storage energy storage, superconducting magnetic energy storage and other technologies. Compared with other energy storage methods, flywheel energy storage technology has the advantages of high energy storage density, high energy conversion efficiency, fast energy charging and discharging speed, strong environmental adaptability, long service life and easy maintenance. At the same time, considering that most vehicles are always in the gravitational field in the working process, which reduces the motion efficiency and increases the energy consumption with the increase of load, it has a wide application prospect to use flywheel as a device for converting kinetic energy from gravity.

China has done a lot of research on the application of flywheel energy storage in vehicles. Flywheel can be used as an auxiliary energy storage unit of electric vehicles, which can output higher instantaneous auxiliary power when the vehicles accelerate and climb slopes, and can improve the energy recovery rate when regenerative braking. There is also a similar structural design in human vehicles. The designed device transmits gravity from the seat plate to the planetary gear through the connecting rod, which makes it rotate, and then drives the outer gear ring and the internal single-stage flywheel to rotate, transforming gravity into kinetic energy. At the same time, some people have studied using flywheel to transform the gravitational potential energy in the bumpy vibration during transportation into kinetic energy to help the bicycle move forward. The above research can provide technical support for the structural design of flywheel energy storage device in this project.

The application of flywheel energy storage technology and the technology of converting gravitational potential energy into kinetic energy in vehicles are important research directions in the future. This project aims to combine them and develop a flywheel device that can effectively convert and store gravitational potential energy, so as to achieve the purpose that flywheel can work normally under various environmental conditions.

The following are the innovations of this project:

1. Aiming at the problem of unreasonable conversion and utilization of gravitational potential energy in the use of existing vehicles, a flywheel device is developed to realize the effective conversion of gravitational potential energy under various conditions and transform it into power, so as to achieve the purpose of lower transportation energy consumption, and the flywheel is widely used in various vehicles.

2. There are few mechanical devices for storing potential energy, which are inefficient and have the problem of narrow practical application. In this project, lever gears, dual-mass flywheels, spring energy accumulators or other structural systems with adjustment and control functions are used to store gravitational potential energy and use it during the movement of vehicles. The details are as

follows: when the vehicle is downhill, the flywheel stores energy to reduce the downhill speed and ensure driving safety; Release energy to provide assistance when going uphill.

3. Optimize the shortcomings of the existing small flywheel energy storage technology in application. At present, the existing small flywheel energy storage devices have high gravity instant conversion efficiency, but the wheel is not suitable for uphill conditions due to its general structure, that is, it is difficult to store gravitational potential energy and cannot be used immediately when needed. The application of the technology of converting gravitational potential energy into kinetic energy in vehicles is an important research direction in the future. The purpose of this project is to combine the two technologies and develop a flywheel device that can effectively convert and store gravitational potential energy, so as to achieve the purpose that the flywheel can work normally under various environmental conditions.

The new flywheel is composed of positive and negative wheels, and the springs and gears are both inside the positive and negative flywheels. During normal operation, the gravitational potential energy is stored by the spring energy storage device and acts on the positive wheels of the two wheels for potential energy conversion; When the wheel travels, the spring compresses (from 9 o'clock direction to 12 o'clock position) and decompresses (from 12 o'clock to 9 o'clock position). During the rotation, the influence of the compression and decompression of the spring mechanism on the rim part provides extra power for rotation.

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电废循环—面向新能源汽车电池中有色金属的电磁涡流分选技术

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Summary. *At present, the new energy power battery is about to enter the decommissioning climax, sorting metal is one of the important step, this paper describes our optimization and innovation of the traditional waste power battery process. The research and development of the new vertical eddy current sorter breaks through the bottleneck of the original equipment, and realizes a breakthrough for the problem of not being able to deal with small-sized electronic waste (original eddy current sorting equipment), the problem of only being able to separate non-metals and metals, not being able to separate different metals at the same time (high-voltage electrostatic equipment), and the problem of high-pollution and high-emission (chemical treatment), focusing on the solution of the recovery of the metal with a particle size of less than 5mm. The Recycling Process is a mechanical-physical device that realizes the separation of small-sized non-metals from metals and between different metals. Based on this, on the traditional*