HELICAL SPRING OPERATED SHOCK ABSORBING BUMPER

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ABSTRACT

This paper represents an theoretical concept of helical spring shock absorbing bumper for vehicle. The Existing shock absorbing bumper are operating different concepts with mostly hydraulic and pneumatic shock absorbers. The Helical Spring Operated shock absorber has less maintenance as compare to hydraulic and pneumatic shock absorbers.

The bumper will absorb impact during collision with compression of springs and absorbed energy will neutralize by expanding compressed helical springs. This Technology will ensure Safety of passengers and goods.

Keywords: Hydraulic, Pneumatic and Bull bars

1. Introduction

Many developing countries including India have a serious road accident problem. Fatality rates (defined as, road accidental deaths per 10,000 vehicles) are quite high in comparison to developed countries. While in Europe and North America the situation is generally improving, many developing countries face a worsening situation. Apart from the humanitarian aspects of the problem, road accidents cost countries of developing world at least one percent of their Gross National Product (GNP) each year – sums that those can ill afford to lose.

Compared to causes of death more commonly associated with the developing world, deaths from road accidents are by no means insignificant [1].

A bumper is a structure attached to or integrated with the front and rear ends of a motor vehicle, to absorb impact in a minor collision, ideally minimizing repair costs [2].

The bumper system also protects the hood, trunk, fuel, exhaust and cooling system as well as safety related equipment. Bumper beams are usually made of steel, aluminum, plastic, or composite material. Bumper beams are also the backbone of the energy absorbing systems located at both front and rear on automobiles. [3]

1.1 EXISTING MODEL AND MODIFICATION

A. Existing Model and Associated Problems

(i) Pneumatic Shock Absorbing Bumpers
(ii) Longitudinal Coil Spring Shock Absorbing Bumper
(iii) Hydraulic Shock Absorbing Bumpers. These systems have many problems like Leakage, weight and maintenance.
All automobiles have components that contain liquids or gas in a sealed container that can burst, rupture, or explode from excessive internal pressure when exposed to heat. For example, tires, batteries, hollow drive shafts, and parts of the air-conditioning system can explode under fire conditions.

The front and rear bumpers of most late-model cars are mounted on hydraulic cylinders designed to absorb the energy of a five-mph crash without damage. Energy-absorbing bumpers are vulnerable to flames licking from under the engine compartment or fuel tank. When heated, the hydraulic cylinders can explode and become projectiles, with sufficient impact to shatter the leg of a firefighter standing within range of the bumpers.

B. Enhanced System

Modified concept will replace Hydraulic and pneumatic system with helical spring. Helical spring is safe during burning of vehicle. This enhanced system also needs less maintenance. This system is work as Primary safety system for vehicle.

The Delhi high court on Tuesday sought a response from the Centre on a plea challenging its recent ban on the fitting of crash guards or bull bars on vehicles. The bench, which asked the ministry of road transport and highways to respond, however, underlined that “human life is more important than the installation of bull bars.”

So the bumper must be flexible and avoid serious damage to human when hits. When springs fully compressed at its higher collision then bumper breaks and Air bag sensors activated as secondary safety system.

2. REFERENCE WORK

A buffer stop, bumper, bumping post, bumper block or stopblock (US), is a device to prevent railway vehicles from going past the end of a physical section of track.

The design of the buffer stop is dependent, in part, on the kind of couplings that the railway uses, since the coupling gear is the first part of the vehicle that the buffer stop touches. The term "buffer stop" is of British origin, since railways in Great Britain principally use buffer-and-screw couplings between vehicles.

2.1 PREVIOUS RESEARCH

Lot of researchers have studied on given topic. Reverse Engineering Based Coil Spring Design Method. Ping Yang[4], Grey-box modeling of a motorcycle shock absorber for virtual prototyping applications. A.K. Samantaray[5], Anderson et al. has discussed that to increase crash performance in automotive vehicles it is necessary to use new techniques such as use of energy absorber and materials. Components linked to crash safety should transmit or absorb energy.

The energy absorbing capability of a specific component is a combination of geometry and material properties[6], Evans D and Morgan T have studied that as vehicle manufacturers continue to become more aggressive with the styling of new vehicles, bumper system technologies will be required to find new solutions that fit into the reduced package spaces while continuing to meet the vehicle performance and cost requirements. It was suggested to introduce new and innovative Expanded Polypropylene (EPP) foam technologies and techniques[7].

3. DESIGN OF COMPONENTS

The bumper facing has split structure of structure. Front plates are flexible and get compressed when vehicle gets hit or any solid obstacle strike the vehicle. All Pressure energy is get stored in spring and this energy will released at the expansion of spring.

This structure is independent type i.e. if corner get hit then only corners spring will compressed and remaining flexible plates and spring will don’t have any changes in their shape and size.

Ref. FIG.A) Dissembled Bumper
4. MERITS AND DEMERITS

Merits:-

A. Durability
Helical spring can work with satisfactory for long time without failure. So helical spring is more beneficial than any other spring.

B. High Precision
Helical Spring have very high precision.

C. Dimensional Stability
Helical spring have dimensional stability.

D. Rugged Construction
Helical spring Rugged Construction to bear load and impact and Can remain in working condition. Easy Maintenance. Due to all reliable and suitable parts the maintenance is very.

E. Easy Maintenance
Due to all reliable and suitable parts the maintenance is very.

F. Reduced Cost
All parts easily available and complex system avoided in this system, So the cost is very minimum.

G. Increased Safety
The hydraulic and pneumatic system work as projectiles during fire so it become very dangerous for people around it. This type of danger is totally eliminated by using non pressurized parts.

5. CONCLUSION

According to the above mentioned concept bumper is so modified that by energy absorber for protecting passenger and goods. So Helical Spring Operated Shock Absorbing Bumper can protect vehicle safely. Operated Shock Absorbing Bumper can protect vehicle safely.

6. REFERENCES


List of Figures:

FIG.A) Disassembled Bumper