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SHOCK ABSORBER IN A BICYCLE : A REVIEW

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Abstract

Shock absorber or shox as they are popularly known, function as dampers of shock resulting from vertical vibration of vehicle. Shock absorber is an essential part of an automobile for absorbing shock during the movement of the automobile. Their basic function to absorb shocks, which are transmitted from the wheels to frame. Thus, they ensure comfortable ride and a better control on vehicle being driven. In addition, they also enhance the life of the vehicle in general and other component in particular. Shock absorber is used in most automobiles like two or three wheelers, cars, jeeps, tractors and Light motor vehicles. Heavy commercial vehicles do not use shock absorbers. They use parabolic spring which can take higher loads. The product mix for shock absorber industry can be defined in various head such as by type – dampers/struts/forks or by special user like defense/railways etc. Major shock absorbers manufacturing in India are as M/s Escorts, Gabriel, Hydraulics, Munjal Showa, Super Shock Sirmour Sudburg, Knorr Bremse etc. In India over 22 millions of shock absorbers are manufactured. The demand for various segment of shock absorbers in volume are over 65% for 2/3 wheelers, 28.95% for cars and Jeeps and around 6% for LCVs. Also out of the total demand, about 55% are used by OEMs, 10% for exports and less than 35% for replacements. Like other auto ancillaries, shock absorbers are highly technology intensive. Various India shock absorber manufacturers have collaboration with foreign companies.

Index Terms: Shock Absorber, Damper, Bicycle etc.

1. INTRODUCTION

A suspension system or shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. The shock absorbers duty is to absorb or dissipate energy.[1]

In a bicycle, the spring or stainless steel plates reduces the effect of traveling over rough ground, leading to improved ride quality, and increase comfort due to substantially reduced amplitude of disturbances. Pneumatic and hydraulic shock absorbers commonly take the form of a cylinder with a sliding piston inside. The shock absorbers duty is to absorb or dissipate energy. These are an important part of automobile suspensions, aircraft landing gear, and the supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance.[4]

1.1 Objective

When a bicycle is travelling on a level road, the spring or stainless steel plate is compressed quickly when the wheel strikes the bump. The compressed spring rebound to its normal dimensions or normal loaded length which causes the body to be lifted. The spring goes down below its normal height when the weight of the bicycle pushes the spring down. This, in turn, causes the spring to rebound again. The spring bouncing process occurs over and over every less each time, until the up-and-down movement finally stops. The bicycle handling becomes very difficult and leads to uncomfortable ride when bouncing is allowed uncontrolled. The designing of spring in a suspension system is very crucial.[2]

1.2 Why Need A Suspension?

- Ride comfort
- Vehicle stability

- Durability of components
- Suspension makes owning and driving a bicycle more meaningful!

1.3 Functions of Suspension System

- To isolate the vehicle from disturbances so that the driver can keep control of the vehicle, without causing discomfort to passengers.
- System should minimize vertical motion, as well as pitch and roll movements, as the vehicle passes over an irregular road, performs turning manouvres, and is accelerated or braked heavily.
- Apart from these basic operational aspects, the suspension should also provide a good level of comfort for the passengers, minimizing the movements and accelerations imposed on and perceived by them.
- The level of comfort is increasingly seen as one of the main contributing factors for purchase decision and satisfaction.
- The disturbances can be caused by irregularities on the road, or caused by loads inherent of the operation of the vehicle, such as acceleration, braking and turning, as well as aerodynamic loads.

2. RUNNING POSITIONS OF SHOCK ABSORBER WHEEL



Fig-1: Normal Position of Wheel



Fig-2: Disturbed Position of Wheel

3. APPLICATIONS

Shock absorbers are used to minimize the shock load and vibrations, and damping purpose. Other applications of shock absorbers are an important part of automobile and motorcycle suspensions, aircraft landing gear, and the supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance. A transverse mounted shock absorber, called a yaw damper, helps keep railcars from swaying excessively from side to side and are important in passenger railroads, commuter rail and rapid transit systems because they prevent railcars from damaging station platforms. The success of passive damping technologies in suppressing vibration amplitudes could be ascertained with the fact that it has a market size of around \$ 4.5 billion.[1]

4. CONCLUSION

The current world-wide production of shock absorbers, is difficult to estimate with accuracy, but is probably around 50–100 million units per annum with a retail value well in excess of one billion dollars per annum.[3]

The condition of shock-absorbers is one of factors influencing the in active-safety technology which help drivers to control of their vehicles in the motion. It stuck in the drivers consciousness, that the damage of the shock-absorber causes the elongation the braking path and the lowering of the drive comfort. The remaining consequences of the worse conditions of shock-absorbers they are not known for the drivers generality. This impinges on the vehicle motion parameters, its steerability and directional stability.

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