Analysis on Shock Absorption In Car By Providing Urethane Buffer In Suspension System For Comfort Driving.

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Abstract

Today automobile industry is most lucrative in India. In vehicle system suspension is the most important component for the comfort driving and road holding capacity. Performance of suspension can be determined by ride comfort and road holding capacity. Ride comfort can be measure by using of vibration test. In new vehicle performance of the suspension better but after some year performance of suspension is reducing which is also impact the suspension life and riding comfort of suspension. So performance of the suspension can be increasing by using urethane buffer. This urethane buffer is implementing in suspension coil spring. Urethane buffer has good shock absorbing capacity. According to the result jerk and vibration is reducing and driving comfort is increasing. By the using of urethane buffer amplitude is reducing up to 27.22 %. With the use of urethane buffer performance of is improved and which is also impact the life of suspension.

Keywords: comfort driving, urethane buffer, reducing vibration

1. Introduction

Today automobile industry is most lucrative in India. In vehicle system suspension is the most important part for the comfort driving and road holding capacity in running condition. Performance of suspension can be determined with the help of ride comfort and road holding capacity. Generally suspension is classified in three categories 1) passive suspension 2) semi- active suspension and 3) active suspension. Passive suspension system has ability to store the energy with the help of spring and dissipate through damper. Passive suspension only can achieve good right comfort or good road holding capacity these two criteria conflict with each other and involving different spring and damper characteristics. In semi-active suspension system with the help of variable damping characteristics and less power offers a considerable improvement [1]. A significant improvement can be achieved by the using of active suspension system. Active suspension system has ability to inject the energy in vehicle dynamic system with the help \of actuator. Now a day mostly active suspension system is because of the good road holding capacity as well as good ride comfort [2].

Suspension is the system of tires, tire air, springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two. Suspension system must support to both road holding as well as comfort ride. Main function of suspension is to wheel keep contact with the road surface and absorbs the shock during pass through during uneven road or at bump. In vehicle design of front and rear, suspension is different. According to Indian road condition, properly working of suspension is most important for the comfort driving. During in running condition on good surface road car run smothery, but on uneven road surface driver can feel the jerk during driving, so properly working of suspension is most important for comfort driving [3]

While during driving on uneven road all load is impact on suspension so due to this sudden load on suspension, spring are fully compressed and sometime due to the overload it is not get back to its original position. Due to this sometime car bottom touch with the



Figure 1. Car Body Touch With Speed Breaker

road surface on uneven road or at bump. So problem is element by the using suspension pad in suspension spring. With the help of using suspension pad increasing height restoration and improving driving comfort as well as road holding.

2. Urethane buffer

Suspension is most important part in vehicle system. Due to the suspension comfortable driving can be achieve. If there is suspension not working properly, vibration and jerk is increasing which affect the other component of the vehicle. According to manufacturer of vehicle suspension life is up to five year, after five year suspension becomes week and performance of suspension is decreasing [1]. This difficulty can be eliminated by using urethane buffer. Urethane buffer is one type of suspension pad which is made by thermoplastic urethane material, which has good shock absorber capacity. Main purpose of urethane buffer protecting the car and potholes damage [4].



Figure 2. Urethane Buffer

Urethane buffer is as shown in figure. It is specially design with the dimension of 10 cm diameter and 6 cm height for the maruti- Suzuki S-Cross. Urethane buffer are different for the front and rear

suspension. For the front suspension 8 cm diameter is used and for the rear suspension 10 cm diameter is use with the same height 6cm.

Urethane buffer is made if premium polymer material with the dimension of 10 cm diameter and 6 cm height. Polymer material is very flexible and to braes any pressure. According to Indian road condition, in some area has uneven road surface and speed barkers which is touch with car bottom. With use of urethane buffer this difficulty is eliminated, with the of urethane buffer restore the car's height and improve the capacity to absorb the shock through restoring coil spring which has comparatively lessened tension. So it is reduce the pressure to avoid suspension damage car damage and ensure the safety. Urethane buffer manufactured with the special processing and applied load test or tensile stress. So with the use of urethane buffer it also impacts the suspension life as well as vehicle life [5].



Figure 3. Front and Rear Urethane Buffer

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	1	
specification	Unit	properties
Specific gravity	-	1.19
Hardness	Shore a	85
Taber abrasion	Mg loss	25
DIN abrasion	Mm ³ loss	25
Tensile strength	Psi	6000
Ultimate elongation	%	590
Tear strength	Lb/in	620
Flexible modulus	Psi	3600
Modulus	Psi	3600

Table1. Material Specification [6].

3. Implement the urethane buffer

Implanting the urethane buffer is very easy, first clean the coil spring of suspension with the shop water. Now put urethane buffer between the coil spring and hardly push the buffer into upward direction. Main purpose of urethane buffer put between the coil springs is to continue resorting suspension height. As shown in figure urethane buffer is very easy to fit in coil spring, but after this check the urethane buffer is fitted between the coil spring or not. If it's not fitted then adjust the urethane buffer because it's not properly fitted, during running condition it's



Figure 4. Clean the Coil Spring



Figure 5. Urethane Buffer in Coil Spring

continuous moving and it's not absorb the shock properly. Main advantages of this buffer are implementing with in 20 min without any difficulty.

3.1. Tensile strength test

In tensile test sample were measured and width and thickness of urethane buffer was recorded at the middle section. Now urethane buffer enter into machine and instron tensile tester software was used for tensile test.

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Sr no	Thickness of	Applied load
	urethane buffer(mm)	(psi)
1	40mm	6162.57
2	60mm	6210.51
3	80mm	6099.23

Table 2 Tensile Strength Test

According to tensile test of the thermoplastic polyurethane material it has good shock absorbing capacity and good elasticity [6]. This test is applied on three different thicknesses of material 80mm, 100mm and 120mm. According to the test applied on urethane buffer on 100mm thickness is good and its take the load up to 6210.51 psi. In this tensile test tack three test of each thickness and average reading we get as shown in table [7].

4. Result and discussion

The main objective of this work is height restoring and improves the driving comfort.. This urethane buffer is applied in Maruti suzuki S-cross with the different tests. According to the tensile test of the urethane buffer, its take up to 6210 51 psi maximum load. Now total weight of S-cross is 1670 kg, but due to the uneven road surface the sudden load on the impact the urethane buffer. So according to tensile test this urethane buffer take the load up to 6210.51 with the thickness 60mm, which is easily fitted between the coil springs of suspension. According to the tensile test of urethane buffer chances of failure is less. According to tensile test urethane has good mechanical property which is suitable for absorb the sudden load. Graphical presentation of tensile test is as shown in below [7].





After applied urethane buffer car run smoothly and improving the driving comfort by reducing jerk. In vibration test measure the vibration in road with continue speed up to 60km/hr and with the 15 sec of interval vibration is measure. Urethane buffer is use for the resorting suspension height and improving driving comfort for driver as well as passenger comfort, which is highly elasticity and good shock observing capacity [8]. With the use of this urethane buffer jerk can reducing. Result of this urethane buffer is as shown in graph.



Figure 8.After Urethane Buffer

As we can in time vs vibration graph with the use of urethane buffer amplitude is 1.31 m/s^2 where without use of urethane buffer amplitude is 1.81 m/s^2 . So with the use of urethane buffer we can reduce jerk and vibration up to 27.22 % during driving and increasing driver comfort. With the use of urethane buffer we increasing also height restoration up to 3 cm to 5 cm as show in figure9 [9].



Figure 9.Height Restoration.

With the use of urethane buffer road holding capacity of tire is good and. Generally suspension life is up to 5 year with proper maintenance but with the use of urethane buffer suspension life is increasing up to 21.42 %.

6 Conclusions

In this paper increase driving comfort, restoring the height of suspension and reducing the vibration and jerk by the using of urethane buffer. According to the result and discussion driving comfort is increasing, vibration and jerk is reducing and vehicle has a good road holding capacity after implement of urethane buffer. Height is resorting up to 3 to 5 cm. according to vibration test amplitude is reducing up to 27.22 %. Use of urethane buffer is impact the life of suspension. Life of suspension is increasing up to 21.42 % after implement the urethane buffer.

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