

Flexible Suspension System

Amey Gaikwad¹

¹Diploma in Automobile Engineering, SVP Polytechnic, Maharashtra, India

Abstract – This Document is for the presentation of a new safety feature in Automobile Industry for better absorption of road bumps / pothole shocks and other obstacles. This project can prevent rims/disc of vehicles from getting damaged by the impact of road bumps and potholes. A rim bend repair can cost somewhere from 10,000 rupees to 'n' amount depending on the type of rim. Hence, this project can increase the absorption power of the suspension system. This document is created in Microsoft word 2010.

shock absorbers are placed upright in almost every motorcycle and other vehicles.

2.1 Statistics

Table -1: Statistics of Road Accidents caused due to potholes/bumps. This information is referred from the, "www.indiatoday.in"

Years	Road Accidents	Persons Killed	Persons Injured
2015	10876	3416	10065
2016	6024	2324	6310
2017	9423	3597	8792

Key Words: Flexible suspension system, improved shock absorbers/suspension system, Safety features of Automobile Industry, Latest safety features of Automobile industry, advanced suspension system, better solution for road shocks.

1. INTRODUCTION

Potholes are one of the primary causes of vehicle damage and road accidents, especially in a country like India where potholes and other obstacle are a severe problem. According to the information on Google around 6 or more people are killed or they get injured every single day due to potholes in some sort of road accidents in India. This is a very serious issue but it's the job of government to find a solution on potholes but we can obviously modify the vehicles according to the road conditions, so I decided to make a project which would help absorb impact of road shocks/potholes and other obstacles like big rocks or some construction materials.

As we can see the number of accidents, deaths and injured people are very high and this is a really very serious issue. Professional riders can easily dodge the potholes and other obstacles but most of the riders and drivers are not that professional and even sometimes professional riders cannot make any moves to prevent from hitting the obstacles due to road conditions. In monsoon season there are too many potholes and other obstacles i.e. big rocks, branches of trees or sometimes even trees which fall during monsoon.

2. The Problem

As I mentioned above, that potholes are a primary reasons for accidents and vehicle damage, so let's assume a pothole is in the way of a motorcycle which is at a pretty good speed say 100km/per hour, and the front wheel of the motorcycle hits the pothole, then the very first thing in contact is the wheel and it is the one which will take almost 90% of the impact force. Due to high impact force, a shockwave is created which can cause vibration in the structure of the vehicle and it can even damage the rim of the wheel. After the impact on the front wheel the rider can even lose control on the motorcycle and this can turn into a dangerous accident causing the rider's death or some severe injury. Even if the rim of the wheel is bent then it can cost a lot, roughly more than 10,000 rupees per rim. We already have shock absorbers in motorcycles and cars to absorb road shock but they cannot take the impact of potholes as the angle of impact is somewhat around 45 degrees, and the

2.2 References



Fig -1: Bent rim of an off-road motorcycle provided by "Adventure Rider"



Fig -2: Bent rim of a street motorcycle provided by "Yamaha FZ-09 Forum"

The above pictures show that how a bent rim of a motorcycle looks like. The first picture shows a bent rim of an off-road motorcycle which is very obvious to get damaged because of the number of obstacles while off-roading, there are a lot more obstacles on off-road tracks as compared to normal streets as the track is uneven and lots of bumps which are created for off-roading. The second picture shows the bent rim of a normal street motorcycle which is maybe damaged because of some pothole or other obstacle on the street. The damage in the first picture is more than that of the second one, so it will cost more if you are willing to repair the bent rim, but it will cost a lot more if you are planning to replace the whole rim. Even if the damage in the second picture seems a bit less but still it can be expensive for repair or replace depending on the manufacturer of the motorcycle.



Fig -3: Bent rim of a car provided by "Rim Blades USA"

This picture shows a bent rim of a car, as we can see that this wheel is of a pretty big size and must be very strong, but still the rim is cracked by the impact force, this gives an idea of the amount of force of the Impact on the wheel.

3. The Solution

The best solution to this major problem can be to add another shock absorber at the front wheel below the existing shock absorber at an angle of 45 degrees to the ground as this angle is perfect to absorb the impact force due to hitting a pothole



Fig -4: Flexible Suspension/shock absorber system.



Fig -5: Flexible suspension/shock absorber system

Picture 4 & 5 gives a pretty good idea of what the flexible suspension system will actually look like. The second shock absorber at an angle of 45 degree will not fit very easily so we need to make some adjustments to the chassis as the shock absorber will be fitted somewhat below the fuel tank. This solution can be applied to all of the motorcycles but mostly it is concentrated to be applied to the touring motorcycles as they have lots of space for modifications and changes can be made in the chassis. Touring motorcycles are more likely to get into accidents because of long touring and off-roading abilities as compared to the normal street motorcycles, and also the impact of the touring motorcycles or superbikes can be more because of high speed as high power is generated from the engines. More the power, more the speed of the vehicle, and if speed is more, then the impact force increases which causes losing control over the vehicle and turns into an accident.

4. CONCLUSION

If this project turns out to be successful then a lot of accidents can be avoided and it can also prevent damage caused to the vehicles which in turn will automatically cut the cost for repairing. This project is mainly concentrated for motorcycles as after hitting any road obstacle, motorcycles are very difficult to control and balance, which basically turns into an accident. Four wheelers and other vehicles can be controlled but still the damage to the vehicle remains the same. Every year lots of patents are added in the automobile industry, which help to prevent accidents and save many people from getting injured, so if this project successfully manages to get patented then I hope that this Flexible suspension system will be seen in Motorcycles and other vehicles on roads.

ACKNOWLEDGEMENT

I would like to acknowledge my respected principal sir "Mr. Naresh Shimpi" (Principal of SVP Polytechnic) for guiding me. I would also acknowledge all the reference websites for providing the information which made my research easier.

REFERENCES

- [1] India today - www.indiatoday.in
- [2] Adventure Rider - <http://www.advrider.com>
- [3] Yamaha FZ-09 Forum - <http://www.fz09.org>
- [4] Rim Blades USA - <http://www.rimbladesusa.com>

AUTHOR



Amey Gaikwad
Student of Diploma in Automobile
Engineering (Third year)