

Modification In Bike Front Suspension System

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Abstract:-

Design and modification of front suspension in motorcycle. Shock absorber are important and crucial operating mechanism which is fabricated to reduce the shock impulses. The common type of the front suspension in motorcycle is telescopic forks which are replaced by mono-suspension. In order to reduce the shock impulse and to provide better handling and safety, the vehicle need appropriate suspension. This modified suspension can reduce the effect of travelling over rough ground, leading to improve ride quality and increase in comfort while driving. In this work mono shock absorber and spring suspension are studied in detail. Now a day's motorcycles uses telescopic forks for the front suspension. The forks can be most easily understood as simply large hydraulic shock absorber with internal coil spring. Forks react to abnormalities in the road and keeps them apart from the motion of vehicle movement.

Key Words-Telescopic Fork, Mono Suspension

I. Introduction

Suspension is the system of tires, tire air, springs, shock absorber and linkages that connects a vehicle to its and allow relative motion between the two. suspension system serve a dual purpose contributing to the vehicle's Road holding/handling and braking for good active safety and driving pressure, and keeping vehicle occupants comfortable and ride quality reasonably well isolated from road noise, bumps, vibration etc. These goals are generally at odds, so the tuning of suspension involves finding the right compromise. It is important for the suspension to keep the road wheel in contact with the road or surface as much as possible, because all the road or ground forces acting on the vehicle do so through the contact patches of the tires. The suspension also protects the vehicle itself and any cargo or luggage from damage and wear.

II. Literature Survey

Prince Jerome Christopher J, Pavendhan R- To design and analyse the performance of shock absorber by varying the wire diameter of coil spring. The spring is compressed quickly when the wheel strikes the bump. The compressed spring rebound to its normal dimension or normal loaded length which causes the body to be lifted. The spring goes down below its normal height when the weight of the vehicle pushes the spring down. This, in turn, causes the spring to rebound again. The spring bouncing process occurs over every less each time, until the up-and-down movement finally stops. The vehicle handling becomes very difficult and leads to uncomfortable ride when bouncing is allowed uncontrolled. The analysis is done by bike mass, loads and number of persons seated on bike.

Basileios Mavroudakos, Peter Eberhard - To replace telescopic suspension with tests on alternative front suspension system. The main difference among these design are related to use of hub-steering and direct and indirect connection between the handle bars and the steering wheel. Four design variation are validated, namely the Hub Steering suspension as used in Bimota Tesi, James Parker layout known as Radd and applied in Yamaha GTS, Hub steering layout featuring a direct connection in handlebars used in slightly different design by French racing team Atomo, Dimensions and physical properties of model where either required or computed.

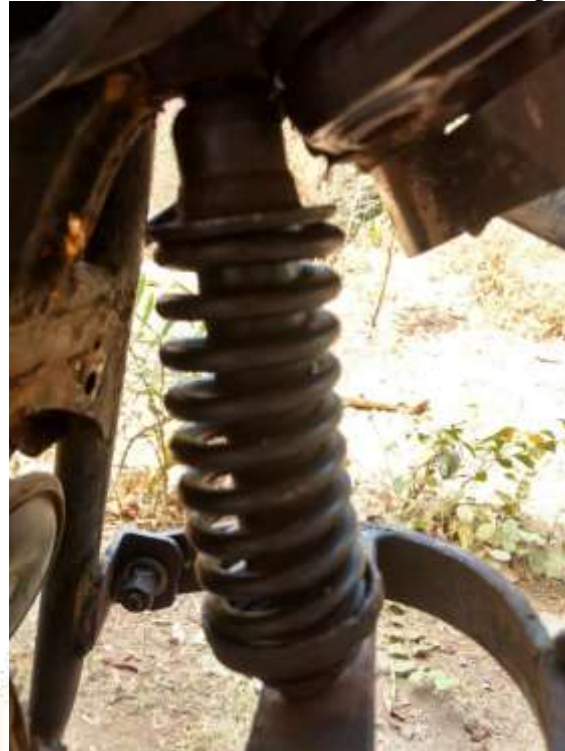
III. Existing System

Telescopic Fork:- A telescopic fork is a form of motorcycle front suspension whose use is so common that it is virtually universal. The telescopic fork uses fork tubes and sliders which contain the springs and dampers



The top of the forks are connected to the motorcycle's frame in a triple tree clamp, which allows the forks to be turned in order to steer the motorcycle. The bottom of the forks are connected to the front axle around which the front wheel spins. On typical telescopic forks, the upper portion, known as the fork tubes, slide inside the fork bodies, which are the lower part of the forks. As the tubes slide in and out of the body they are telescoping, thus the term telescopic forks. The fork tubes must be smooth to seal the fork oil inside the fork, and typically have a mirrored finish, though some fork tubes, especially those on off-road motorcycles, are enclosed in plastic protective sleeves, known as gaiters.

Mono shock in Front Suspension:



IV. Proposal System

On a motorcycle with a mono-shock suspension, a single shock absorber connects the rear swing-arm to the motorcycle's frame. Typically this lone shock absorber is in front of the rear wheel, and uses a linkage to connect to the swing arm. Such linkages are frequently designed to give a rising rate of damping for the rear. Mono-shocks are said to eliminate torque to the swing arm and provide more consistent handling and braking. The principal design alternative to the twin-tube form has been the mono-tube shock absorber which was considered a revolutionary advancement when it appeared in the 1950s. As its name implies, the mono-tube shock, which is also a gas-pressurized shock and also comes in a coil over format, consists of only one tube, the pressure tube, though it has two pistons. These pistons are called the working piston and the dividing or floating piston, and they move in relative synchrony inside the pressure tube in response to changes in road smoothness. The two pistons also completely separate the shock's fluid and gas components. The mono-tube shock absorber is consistently a much longer overall design than the twin-tubes, making it difficult to mount in passenger cars designed for twin-tube shocks. However, unlike the twin-tubes, the mono-tube shock can be mounted either way—it does not have any directionality. It also does not have a compression valve, whose role has been

taken up by the dividing piston, and although it contains nitrogen gas, the gas in a mono-tube shock is under high-pressure (260-360 p.s.i. or so) which can actually help it to support some of the vehicle's weight, something which no other shock absorber. An improvement in motorcycle frames having a generally closed configuration with generally horizontal upper and lower frame members and spaced generally front and rear vertical members transverse to and connecting said upper and lower members to form a closed configuration and a drive sprocket is provided in the form of a pair of spaced generally horizontally extending swing arms on each side of said frame and a rear wheel, said arms extending rearward from the rear member and each pivoted adjacent one end on said frame, a generally vertical link connecting the other ends of said swing arms and receiving an axle shaft for the rear wheel intermediate the two swing arms, spring means pivotally connected at one end to at least one swing arm of each pair of swing arms at the other end to at least one of the other swing arms and the frame and link means in one of said pivot connections of said spring means whereby deflection of said swing arms from a first normal position upwardly around their pivot at the frame causes a progressively rising rate of deflection of said spring means weight and cost considerations, structures are not made more rigid than necessary.

Advantages:-

1. Mono-shocks eliminate torque to the swing arm and provide more consistent handling and braking.
2. They are also easier to adjust, since there's only one shock to adjust, and there is no worry about matching two shocks.
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4. Also, the linkages used to connect the shock to the swing-arm are frequently designed to give a rising rate of damping for the rear.
5. The mono shock improves both the ride and handling if tuned well.

6. The simple reason for it being better can be understood by the following explanation- "Whenever you encounter a bump on a Motorcycle with two shocks, both the shocks compress, but there is never a situation when both of them compress for the equal length. This leads to downgraded dynamics when it comes to stability. But with a single shock absorber, this problem is solved.
7. In a recent test conducted by Bike Magazine, Pulsar, Apache and Unicorn were pitted against each other on a test track. Although the unicorn was not the fastest, they said it is the most confidence inspiring and the most balanced. Upper limit for that vehicle's weight. This allows the vehicle to perform properly under a heavy load when control is limited by the inertia of the load. Riding in an empty truck used for carrying loads can be uncomfortable for passengers because of its high spring rate relative to the weight of the vehicle.

Disadvantages:-

- 1) Payload less, because the focus shock-breaker concentrated at one point attempted to make the duty not to exceed the standards set by the manufacturer of your motorcycle. If you ignore it, it's going shock-breaker be damaged.
- 2) More expensive. Due to the quality of mono shock shock-breaker better, making it more expensive than the double-shock.
- 3) Age systematic use of motorcycle suspension is relatively shorter mono shock.

V. Design of Frame

The design proposal of the frame of the front suspension of motorcycle using ANSYS.



Actual image of a front suspension system



VI. Result and Discussion

We have designed a shock absorber used in bike and we have modelled it using 3D parametric software called solid edge. The shock absorber design is modified by reducing the diameter and stress analysis is performed. The stress value is lesser in our designed spring than in original which adds an advantage to our design. comparing the results in the table we could analyze that our modified front suspension has reduced in weight

and it is safe. This invention overcomes the prior art disadvantages and provides an aesthetically pleasing adjustable front end spring support.

VII. Conclusion

We have designed a Shock Absorber used in bike and we have modelled it using 3D parametric software called Pro/Engineer. The shock absorber design is modified by reducing the diameter and stress analysis is performed. ‘The stress value is lesser in our designed spring than in original which adds an advantage to our design’. By comparing the results in the table we could analyze that our modified front suspension has reduced in weight and it is safe. This invention overcomes the prior art disadvantages and provides an aesthetically pleasing adjustable front end spring support.

VIII. References

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