

Design and Optimization in Enhancement of Stability of Motor Bikes

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ABSTRACT: The vehicle uses two tires at front and single same size tyre at rear. Together with the revolutionary front suspension, the wheels provide a tilt angle of up to 40° while riding like any normal two wheeler and simultaneously ensuring better road grip on any surface, especially slippery tracks. The suspension also ensures increased stability at high speeds; the vehicle grips the road firmly, with no wobbling, even when tailing large vehicles. Besides its exceptional stability, the vehicle also provides brilliant braking thanks to twin brakes, The result is record deceleration with braking space reduced by over 20 per cent on normal road surfaces and as much as 24 per cent on slippery roads compared to a traditional two-wheel scooter.

KEYWORDS: Wobbling, Traction, Braking Distance. Etc.

I. INTRODUCTION

Stability enhancement in two wheelers is the main prime focus of our project where in we concentrate in improving the stability of the two wheelers because this is one of the prime reasons for mishaps in our road so we try the best possible ways to improvise the stability of two wheeler and now we have handled some ways in order to extract the expected results. This turned out to be best way to improve the stability if this has to be explained in simple words by which everyone will be able to easily understand our project is that we have done nothing but added additional wheels to the front end of the vehicle there is another usual way of improving stability by which we add wheels to the rear end of the vehicle that acts as a support for the people who are differently abled but there we come across so many drawbacks in that old and conventional method so in order to overcome the drawbacks we have come up with a new concept and idea of adding a wheel to the front part of the vehicle which slightly overcomes the drawback of the former model.

By adding a wheel to the front portion of the vehicle which obviously adds two independent suspension for both the wheels which adds up to the additional enhancement in the stability of the vehicle on road. This makes the vehicle even more agile for the Indian road. Agility is one of the main things in this project that actually is an extra edge for the driver to steer the vehicle in desired direction without too much of fatigue and he can easily have the vehicle in his control and now the main key factor is that the front portion of the vehicle actually does not take up too much of road space which is main thing in the road traffic. So that is one main reason that makes the vehicle more agile for our Indian roads. Handling is the main thing but more importantly the road grip is also equally important so that the vehicle does not roll over when it is at its best maximum speed.[1]

II.TILT MECHANISM

Tilt mechanism is the main feature of our work the vehicle can be tilted on both the ways easily and it does not fail where the vehicle is managed evenly on both the sides at the time of cornering and making turns in steep turns and

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narrow roads so that it easy to handle and control the vehicle and also to go in a decent speed. The vehicle need not be slowed down at the times of cornering it can maintain the same speed it will be able to tilt on both the sides evenly. The driver should not feel the sheer stress and the load of the vehicle plus his load all acting at the same time in the handle when riding so that it is better if the vehicle is supplemented with two individual suspension for both the wheels. Because of the addition of two wheels to the vehicle there is no way that there will be any mileage drop. There will not be any decrease in the efficiency of the vehicle but still the aerodynamics is designed in such a way that if there is any addition of deletion of any single part of the vehicle the vehicle will tend to decrease the efficiency but this only to an manageable extent but our focus is to improve the stability of the vehicle so there will not be much concentration on the engine part. [2]The vehicle tends to adjust itself according to the load acting on the vehicle and at the time of sudden braking and turning. The front suspension it optimized in this in order to reduce its weight for the small version of three wheeler passenger vehicle.

III.SUSPENSION MECHANISM

Its three-wheel mechanism, the MP3 can be stopped and parked like a car, without using a traditional kickstand or centre stand, and can be parked on irregular or side-sloping ground. The front suspension is similar to the single-sided trailing arm of Vespa-style suspensions, linked by an alloy parallelogram and a central steering arm. When moving at slow speeds or stopped, the rider maintains balance by maintaining forward motion or placing feet on the ground. The front suspension locks or unlocks with the via a switch, located just below the throttle on the right handlebar.[5]

The suspension lock can be activated only manually, and only at low speeds or at a stop; it is disengaged when the engine speed exceeds 2,500 rpm. A parking brake is used in conjunction with the locking mechanism to park the bike. A traditional center stand also is provided, useful in situations where the suspension cannot be locked, such as with a dead battery (though the suspension will remain locked if the battery fails or is removed while the scooter is parked.

A four-stroke engine (also known as four-cycle) is an internal combustion engine in which the piston completes four separate strokes which constitute a single thermodynamic cycle. A stroke refers to the full travel of the piston along the cylinder, in either direction. The four separate strokes are termed:[3]

- **Intake:** this stroke of the piston begins at top dead center. The piston descends from the top of the cylinder to the bottom of the cylinder, increasing the volume of the cylinder. A mixture of fuel and air is forced by atmospheric (or greater by some form of air pump) pressure into the cylinder through the intake port.
- **Compression:** with both intake and exhaust valves closed, the piston returns to the top of the cylinder compressing the air or fuel-air mixture into the cylinder head. [4]
- **Power:** this is the start of the second revolution of the cycle. While the piston is close to Top Dead Centre, the compressed air–fuel mixture in a gasoline engine is ignited, by a spark plug in gasoline engines, or which ignites due to the heat generated by compression in a diesel engine. The resulting pressure from the combustion of the compressed fuel-air mixture forces the piston back down toward bottom dead centre.

- **Exhaust:** during the exhaust stroke, the piston once again returns to top dead centre while the exhaust valve is open. This action expels the spent fuel-air mixture through the exhaust valve.

Function:

The spark ignition engine uses a highly volatile fuel, which easily vaporizes. The fuel is mixed with air before it enters the engine cylinders in the carburettor. This mixture then enters the cylinders and is compressed. Next an electric spark is produced by ignition system ignites the compressed air fuel mixture. A two-stroke, or two-cycle, engine is a type of internal combustion engine which completes a power cycle in only one crankshaft revolution and with two strokes, or up and down movements, of the piston in comparison to a "four-stroke engine", which uses four strokes. This is accomplished by the end of the combustion stroke and the beginning of the compression stroke happening simultaneously and performing the intake and exhaust (or scavenging) functions at the same time.[6]

Two-stroke engines often provide high power-to-weight ratio, usually in a narrow range of rotational speeds called the "power band". Compared to 4-stroke engines, they have a greatly reduced number of moving parts, are more

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compact and significantly lighter. The first commercial two-stroke engine involving in-cylinder compression is attributed to Scottish engineer Dugald Clerk, who in 1881 patented his design, his engine having a separate charging cylinder. The crankcase-scavenged engine, employing the area below the piston as a charging pump, is generally credited to Englishman Joseph Day.

Gasoline (spark ignition) versions are particularly useful in lightweight (portable) applications such as chainsaws and motorcycles. They are used in diesel compression ignition engines in large and weight insensitive applications, such as ships, locomotives and electricity generation. The heat transfer from the engine to the cooling system is less in a two-stroke engine than in a four-stroke. This adds to the overall engine efficiency. Crankcase compression two-stroke engines, i.e. the common small gasoline engines, have higher exhaust emissions than four-stroke engines as their petrol lubrication mixture is also burned in the engine.

The two-stroke petrol (gasoline) engine was very popular throughout the 19th-20th century in motorcycles and small-engined devices, such as chainsaws and outboard motors. They were also used in some cars, a few tractors and many ships. Part of their appeal was their simple design (and resulting low cost) and often high power-to-weight ratio. The lower cost to rebuild and maintain made the two stroke engine incredibly popular, until for the USA their EPA mandated more stringent emission controls in 1978 (taking effect in 1980) and in 2004 (taking effect in 2005 and 2010). The industry largely responded by switching to four-stroke petrol engines, which emit less pollution. Most small designs use petrol (two-stroke oil) lubrication, with the oil being burned in the combustion chamber, causing "blue smoke" and other types of exhaust pollution. This is a major reason why two-stroke engines.

Fuel Injection:

Fuel injection and computer engine management systems are now normal on middle range and larger motorcycles and are increasingly being incorporated onto the smaller machines, partly driven by better emission control and lower maintenance but mostly by manufacturing cost considerations. Ignition systems moved from magneto in the 1950s to battery-coil-contact breaker (points), and these were increasingly superseded by Capacitor Discharge Ignition (CDI)[7]

Turbo and Superchargers:

Superchargers (blowers) were common in the GP's, until they were banned (which didn't help the two-strokes; before Walter Kaaden's new technology, they needed the help against the four-strokes). The big four made a turbocharged bike, and Honda made two, mainly as an exercise in technical expertise and later discontinued them for more conventional methods. Bolt-on superchargers are available for street bikes and are essential for performance applications such as drag bikes and land speed record streamliners. Most sports bikes now use some sort of 'ram-air' system where as road speed increases, more air is forced through ducts in the fairing to pressurize the airbox.

IV. DESIGN

The vehicle MP3 has innovative, eye-catching styling while maintaining a clear resemblance to the vehicle GT range.[8] The new two-wheel front assembly doesn't detract in the least from the vehicle MP3's sleek styling. Its size and proportions are those of a normal compact GT scooter, with an overall front-end width of only 420 mm. The most advanced calculation programmes and three-dimensional measurements were carried out from the initial phase of the vehicle MP3 project to enhance the vehicle's ergonomics.



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The result is a vehicle that offers top-of-the-line comfort, safety and ease of use. The front shield provides exceptional protection. An extremely comfortable seat adapted to riders of any size has been made to measure for the vehicle MP3. Generous padding and the shape of the built-in backrest provide perfectly ergonomical seating, while saddle height of a mere 780 mm from the ground makes the vehicle easy to manoeuvre in any circumstances. The optimal height difference between the front and the rear parts of the saddle and ideally located rear handgrips ensure passenger comfort and protection. A handy remote control button on the ignition key opens the seat lock and the rear boot lid. A number of mainstream automobile manufacturers have used two-stroke engines in the past, including the Swedish Saab and German manufacturers DKW and Auto-Union.

V.RESULT

Thus the results are in favor with the supplements that have been added to the vehicle to improve the stability and the test results are in accordance with our expected results. This definitely can be used in further research for the betterment of this research work, so that it can be brought into regular usage in to daily life.

VI.CONCLUSION

Road accidents are nowadays turning out very fatal and our prime focus was to reduce the accidents and so we decided to improve some parameter that poses to be a major reason for accidents so in order to do that we wanted to improve the stability of the vehicle by which disbalance is not going to be a reason for accidents anymore. We succeeded in adding an extra wheel to the two wheeler which results in the improvement and enhancement of the stability of the vehicle. The results are compared on common scale and the acceptance of the modification shows good agreement. This work may be extend to optimize and redesign the steering column and suspension arm by using topology optimization which results in considerable material saving without compromising its required strength. The change of material can be thought of to get better results.

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