

DESIGN OF AUTO-TILTING MECHANISM

¹Gaurav Khairna, ²Pratiksha Demse, ³Sanket Chavan,
⁴Snehal Ashtekar, ⁵Swapnil Kasar

^{1,2,3,4,5} Mechanical Engineering, Guru Gobind Singh Polytechnic, Nashik, Maharashtra, (India.)

ABSTRACT

As we know that safety of the vehicle is the first and the foremost thing to be considered in 2-wheelers the safety of the vehicle from accident was understated on two major factors, Directional stability and the Aerodynamic force both are correlated to each other. The use of tilting mechanism in automobile would decrease the rate of accidents due to slippage. It will give better dynamic stability as well as directional stability to the vehicle, better road grip, better comfort to the passengers, and the most important load carrying capacity of vehicle increases. This is the why most of the automobile companies are producing the prototypes of tilting mechanism for automobiles. In our project work we have tried to develop a tilting mechanism for the vehicle. This feature enables the vehicle to tilt in to the curve while negotiating it. Our analysis shows that to increase the maximum curve at speed of more than 50%, this mechanism is really useful. The method we have used is a simple mechanical tilting system by using the flexible linkages and the shock absorbers. This tilting mechanism if successful would dramatically increase the maximum speed in curves. This would also provide the advantages of increased passenger comfort and handling. A tilting mechanism allows the vehicle to have leaning characteristics similar to those offered by an inline two wheel vehicle, but that does not require complex linkages or control system to operate effectively. A tilting linkage is operationally secured to a frame to allow a pair of spaced apart wheel to remain substantially aligned with the plane of the vehicle throughout its range of movements.

Keywords: *Tilting Mechanism, Shock Absorbers, Connecting Links, Safety, Stability And Comfort*

I INTRODUCTION

In India, the population is rising rapidly. Due to increase in population, the traffic conditions are bad and will be worst in the upcoming years. . The big nasty part of our daily life is the commute and since the countries (like INDIA) are massively overcrowded. For the individual who like to drive the vehicles without affecting the traffic one can choose the bike with Tilting Wheel Mechanism which inhibits the advantages of a 4 wheelers and eliminates the drawbacks of the 2 wheelers. These type vehicles have several advantages like, better directional stability, increased comfort, reduces wheel slippage, better stopping power.

Due to all these advantages such vehicles combine the comfort of a car with the functionality of a motor bike. But these cars have a very important and dangerous drawback. Due to implementation of tilting mechanism in

two-wheeler, the weight of the vehicle increases which comparatively reduces its efficiency. But when the similar concept would be implemented in the three -wheeler, this mechanism will be of great importance.

Our project took shape as an attempt to face this drawback. We thought so if the motor cycle has the flexibility, why not give it the comfort of the car. This gave use to the idea of an auto-tilting car. There have been many tilting body designs in rail but what we have done is not just a body tilting, in it the vehicle tilts as a whole. Recently there had been some development in making three- wheeled tilting cars like the carver, but only prototypes or concepts exist in the field of four-wheeled tilters.

II OBJECTIVES OF PROJECT

1. To provide directional stability
2. To provide comfort to the passengers
3. Increased load carrying capacity
4. Reduce the accidents due to skidding
5. The objective of this project work is to successfully develop a design of a tilting mechanism for automobile.
6. The aim of this tilting mechanism is to provide banking to the vehicle on unbanked curves, so as to enable added threshold speed on curves.

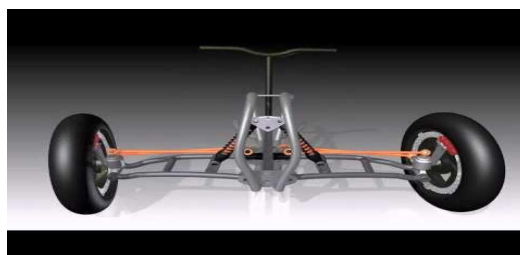
III METHODOLOGY

1. The Two wheels at front i.e. one on each side of the handlebar
2. Two shock absorbers connected to the flexible or adjustable connecting rods
3. Adjustable connecting links
4. Fixed connecting links
5. Handle fork

Methodology adopted to use standard and presently used components in design rather than to design all components from ground up. The advantage of this method is that, you do not have to spend ridiculous amount and time in testing the integrity of each part as they have already proved their worth in real world applications. Initially the frame design was adopted from an already existing narrow car and minor changes were made to suite our purpose.

IV PROJECT SPECIFICATIONS

The vehicle with Tilting Mechanism would consist of:



V VEHICLE SPECIFICATIONS

SR NO.	PARTICULARS	SPECIFICATIONS
1.	Vehicle type	2-wheeler CT 100
2.	Engine	110 CC
3.	Fuel	Petrol
4.	Leaning angle	25 to 30 degrees

VI FABRICATION OF TILTING MECHANISM

After designing the tilting mechanism, we have selected the material as per specifications. The front tyre of the vehicle was first dismantled. The two tyres are connected by the links instead of one tyre. Two links are flexible or adjustable whereas other two are fixed. Two shock absorbers are connected between the handle bar and flexible links. When the vehicle goes across road irregularities, the adjustable linkages will automatically adjust the distance between two wheels and the shocks will not transmit to the vehicle body. It has another function that while negotiating the dead turns, only the wheels will tilt and the body will remain stable.



VII ADVANTAGES

1. It will give better comfort to the passengers.
2. It reduces rate of accidents due to skidding.
3. The vehicle will be useful on highways as well as on off roads.
4. Good directional as well as dynamic stability.
5. Load carrying capacity increases.
6. Driver is safe while taking sharp turn on the road cause possibility of skidding or falling of bike is almost negligible.

VIII DISADVANTAGES

1. Whole weight of the vehicle increases.
2. Fuel consumption increases.
3. Stand of the bike is of no use because bike stands easily on three wheels.
4. Weight shifting while turning is required.

IX APPLICATIONS

1. It may be used in rainy seasons
2. Suitable for handicapped people
3. It can be implemented in four wheeler and also three wheeler

X CONCLUSION

1. We have successfully achieved the tilting of the vehicle up to 30 degrees with better performance.
2. The tilting mechanism gives satisfactory performance while taking a sharp turns.
3. It reduces accidents which occurs due to skidding.
4. The mini-prototype to demonstrate tilting is also working successfully.

REFERENCES

1. "Design of Machine Element", V.B. Bandar, Tata McGraw Hill, Third Edition.
2. "Design data book" PSG, Kalaikathir Achchagam, 1978 Edition.
3. "Machine Design", R.S. Khurmi & J.K. Gupta, S Chand & Company Ltd., Fourteen Edition.
4. "Theory of Machines", R.S. Khurmi & J.K. Gupta, S Chand & Company Ltd., Fourteen Edition.
5. "Mechanical Engineering Design", Shigley J.E and Mischle C.K, Tata McGraw Hill.
6. "Automobile Engineering", Dr. Kripal Singh, Vol 1 & 2, Standard Publication, 11th Edition.