

Tilting Trike Bike

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Abstract : Generally a tilting three wheeler is a vehicle whose body and wheels tilt in the direction of the turn. The tilting trike bike is designed to tackle rough terrain and also boasts of high safety features for the rider. It uses a A-arm to support the tilting mechanism. The main advantage of this mechanism is that it can tilt while turning. By this leaning the centre of gravity balances the centrifugal force which is acting on the vehicle and makes it more stable during turning. It gives more traction when roads are slippery. The third wheel offers better braking as well as increases stability. It gives comfortable ride. It also ensures a lot of safety for the rider.

Key Words: A-arm, Dependent arm, Tilting mechanism, Mono-shock, drive mechanism

a) INTRODUCTION

Today, the use of more efficient vehicles is being discussed to improve the energy performance and better utilize the space of existing roads in the cities. 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 of which are correlated to each other. The tilting mechanism would dramatically increase the maximum speed in curves. 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. By this leaning, the centre of gravity balances the centrifugal force which is acting on the vehicle and makes it more stable during turning.

As engineers we have developed a revolutionary design to tackle varying terrain conditions and improve safety. We call it 'The Tilting Trike Bike'. A tilting bike has the advantages of both the types of vehicles that is cars and bikes. When the vehicle leans into a corner it virtually acts like a single track vehicle, and even though having three wheels it can be driven like a motorcycle. The third extra wheel gives the extra traction required to tackle the corner.

Generally a tilting three wheeler is a vehicle whose body and wheels tilt in the direction of the turn. We achieve this by adding an extra wheel to a two wheeler chassis. Generally there are two types of configurations for a three wheeled vehicle. They are tadpole and delta. For our trike bike we are employing a tadpole configuration. This ensures that power is transmitted to only one wheel thus reducing transmission losses. Our vehicle can corner without roll over because the tipping movement caused by acceleration is balanced by the opposing centripetal acceleration. Safety is one of the major considerations in design. This has been keenly dealt with. Off-roading is also a trump card for this vehicle.



III. Methodology & Objectives

The design of the required model is created. Then we find a suitable location to work, after which we try to determine the exact time required for the whole process. All required materials (raw material) are arranged as required. Materials are checked for stress and strain under load. The best suitable material is chosen. All required tools are arranged. Individual elements are prepared separately such as A-arms etc. These elements are then taken to the machine shop. Welding is done according to the former proposed model. All the joints are checked and the structure is tested. The suspension system is attached, after which the wheels are installed. A road test is done and troubleshooting is performed. The final product is presented.

- To attain total stability of the three wheeled trike.
- To achieve extreme angles of tilt.
- To achieve a higher factor of safety.
- To avoid rollover of the vehicle.
- To induce a comfortable ride and handling package.
- To achieve traction on multiple terrains.
- To reduce stress on the rider when on rough terrain.

II. Experimental Procedure:

The fig given below is a sketch of the assembly of the leaning mechanism. This mechanism is placed between the front two wheels of the trike.

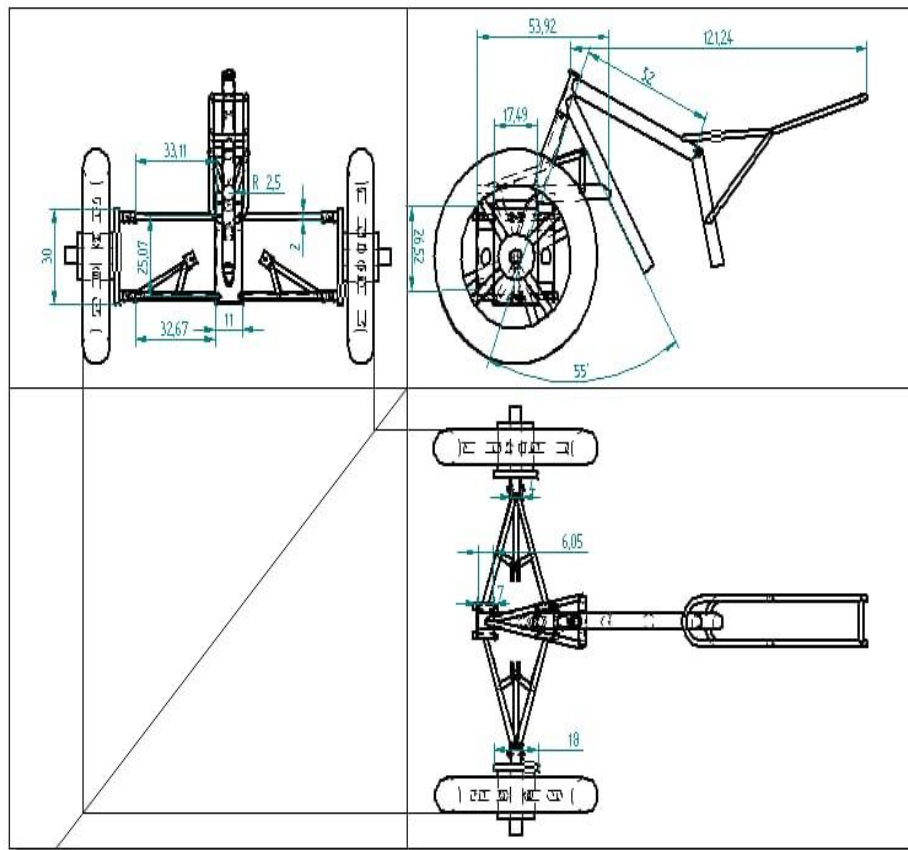


Fig.1(Leaning Mechanism)

In a normal bike telescopic suspension is used for suspension. To achieve the required characteristics we have employed dependent A-arm with single suspension. The principle of our tilting trike bike revolves primary on the A-arm structure. The suspension is placed horizontally supported by A-arms on either sides. When under action The vehicle leans pushing the arm thus allowing the whole the vehicle to lean in the direction of the tilt. When one of the wheels is subject to off road condition or falls in a pot hole the arms allow for verticle travel thereby allowing a thirty percent increase in damping over a conventional system.

Result and Discussion:

As we are going to attach a tilting mechanism, a lot of moving parts will be included. To maintain balance between all parts a sequential and right order of arrangement is required. In our case the materials used should sustain all applicable loads and varying terrain conditions. The tilting mechanism should be strong enough to sustain the load including the frame and rider along with other accessories. The material has to be forged into required shapes for different sections. For this the material should have good bending properties. During the welding process a lot of heat is generated which will affect the material's strength. The whole process has to be done with precision and accuracy so as to attain required results. The center of gravity of the vehicle is to be taken into consideration. Fabrication and finishing will be time consuming. There may be unknown problems which will occur after the road test which will be catered at a later stage.

CONCLUSION:

All efforts are successful. As mentioned earlier the Three wheeled Tilting Trike is a revolutionary engineering product designed to meet varying terrain conditions. The vehicles cornering ability is really good. This mechanism fits on vehicles having bracket fixed on chassis. The response desired is inevitable. It is a safe option for the rider and also allows for enthusiastic riding. It is simple to drive. The performance, handling and safety is really good. With sportiness and safety combined it is a wonderful product. With this engineering product the rough terrains will be easy to tackle.

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