

Designing and Fabrication of Multiple Mode Steering System

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ABSTRACT: here we have fabricated the four wheel steering with three mode operation. the main aim of this project is to steer the vehicle according to the requirement. the four wheel steering is more required in critical roads and in desert roads. in this project we implement three steering modes in a single vehicle and the modes can be changed as needed.

KEYWORDS: three mode steering ,four wheelers , critical roads , effective perform

I. INTRODUCTION

Here we have fabricated the four wheel steering with three mode operation. the main aim of this project is to steer the vehicle according to the requirement. the four wheel steering is more required in critical roads and in desert roads. in this project we implement three steering modes in a single vehicle and the modes can be changed as needed.

II. LITERATURE

In an active four-wheel steering system, all four wheels turn at the same time when the driver steers. In most active four-wheel steering systems, the rear wheels are steered by a computer and actuators. The rear wheels generally cannot turn as far as the front wheels. There can be controls to switch off the rear steer and options to steer only the rear wheel independent of the front wheels. At low speed (*e.g.* parking) the rear wheels turn opposite of the front wheels, reducing the turning radius by up to twenty-five percent, sometimes critical for large **trucks** or tractors and vehicles with trailers, while at higher speeds both front and rear wheels turn alike (electronically controlled), so that the vehicle may change position with less yaw, enhancing straight-line stability. The "Snaking effect" experienced during **motorway** drives while towing a **travel trailer** is thus largely nullified.[*dubious* – discuss]

Four-wheel steering found its most widespread use in monster trucks, where maneuverability in small arenas is critical, and it is also popular in large **farm** vehicles and trucks. Some of the modern European Intercity buses also utilize four-wheel steering to assist maneuverability in bus terminals, and also to improve road stability.

Previously, **Honda** had four-wheel steering as an option in their 1987–2000 **Prelude** and Honda Ascot Innova models (1992–1996). **Mazda** also offered four-wheel steering on the **626** and **MX6** in 1988. **General Motors** offered Delphi's **Quadrateer** in their consumer Silverado/Sierra and **Suburban**/Yukon. However, only 16,500 vehicles have been sold with this system since its introduction in 2002 through 2004. Due to this low demand, GM discontinued the technology at the end of the 2005 model year. Nissan/**Infiniti** offer several versions of their **HICAS** system as standard or as an option in much of their line-up. A new "Active Drive" system is introduced on the 2008 version of the **Renault Laguna** line. It was designed as one of several measures to increase security and stability. The Active Drive should lower the effects of under steer and decrease the chances of spinning by diverting part of the G-forces generated in a turn from the front to the rear tires. At low speeds the turning circle can be tightened so parking and maneuvering is easier.

Working Principle

Our project consists of a steering setup, spur gears, bevel gears and lock nut. The three modes are,

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1. Front wheel steer
2. Both front and rear wheel steer in same direction
3. Both wheels in opposite direction

When the lock nut is removed, the steering operation is carried out in normal condition. That is only front wheels steer. But when the lock nut is inserted, the other two modes can be used. When the gear arrangement is pushed to one position, the spur gears get engaged and the steering of rear wheel is ensured and is in same direction as that of the front wheels. When the gear arrangement is moved to other side, the spur gear disengages and the bevel gear gets engaged. Due to bevel gear arrangement, the rear wheel steers in opposite direction to the front wheel. This results in third mode steering.

III. DESIGN OF EQUIPMENT AND DRAWING

Components

The four wheels steering with three mode operation consists of the following components to full fill the requirements of complete operation of the machine.

- Rack and pinion
- Bevel gear
- spur gear
- Steering
- Wheel

Drawing

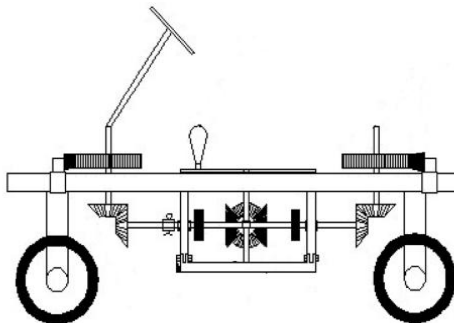


Fig.4 Side view

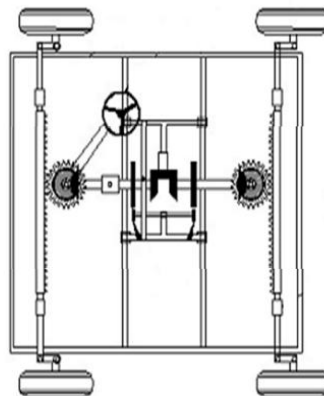


Fig.5 TOP VIEW

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IV. FACTORS DETERMINE THE CHOOSE OF MATERIAL

Properties

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection

- a. Physical
- b. Mechanical
- c. From manufacturing point of view
- d. Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.

The various Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties. The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc

Manufacturing Case

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

Quality Required

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

Availability of material

Some materials may be scarce or in short supply. It then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

Cost

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored. Some times factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.

It has merits easy to maintenance, mode change is easy and implementation is easy. Demerits in Gear arrangement adds weight to the vehicle. It has major applications while used for easy parking in four wheelers and it is applicable for all four wheeled vehicles.

V. CONCLUSION

The project carried out by us made an impressive task in the field of automobile industries. It is very usefully for driver while driving the vehicle.

This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

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