INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 7, Issue 3 - V7I3-2004)
Available online at: https://www.ijariit.com

Four-wheel steering mechanism

Virendrakumar Hubalal Patel
pvirendra817@gmail.com
Bharati Vidyapeeth' Institute of Technology, Navi Mumbai, Maharashtra
Nikhil Banne
nikhilbanne.08@gmail.com
Bharati Vidyapeeth' Institute of Technology, Navi Mumbai, Maharashtra
Yash Patil
yashpatil1237@gmail.com
Bharati Vidyapeeth' Institute of Technology, Navi Mumbai, Maharashtra
Abhijit Mandal
mandalabhijeet8@gmail.com
Bharati Vidyapeeth' Institute of Technology, Navi Mumbai, Maharashtra

ABSTRACT

Now a days most of the vehicle using two wheel steering mechanism as the main handling system. But the efficiency of the two wheels steering vehicle is proven to be low as compared to the four wheel steering vehicle Four wheel steering can be adopted to increase the steering response, increase vehicle stability on a certain speed to decrease the turning radius. If a car could automatically compensate for an under steer/over steer problem, the driver would enjoy nearly neutral steering under varying operating condition. Four wheels is serious effort on the part of automotive design engineers to provide near-neutral steering. Also in situation like low speed cornering, vehicle paring and driving in city condition with heavy traffic in tight spaces, driving would be very difficult due to vehicle's large wheelbase and track width. Hence there is requirement of the mechanism which result in less turning radius and it can be achieved by implementing four wheel mechanisms. Instead of regular two wheel steering.

Keywords: *Four Wheel Steering Mechanism, Four Wheel Steering at Different Speed.*

1. INTRODUCTION

4 wheel steering is a technique developed in automobile enterprise for the effective turning of the car and to increase the maneuverability. In a typical the front wheel guidance device the rear wheels do not flip in the path of the curve and for this reason minimize on the performance of the steering. In 4 wheel steerage the rear wheels flip with the front wheels hence increasing the efficiency of the vehicle. The course of guidance the rear wheels relative to the front wheels depends at the running conditions. At low pace wheel movement is mentioned, so that rear wheels are suggested in the opposite path to that of front wheels. At excessive speed, whilst guidance changes are diffused, the front wheels and the rear wheels flip in the identical path. By means of changing the direction of the rear wheel there's discount on turning radius of the car that is efficient in parking, low velocity cornering and high velocity lane converting. In metropolis using situations the car with better wheelbase and music with face troubles of turning as the distance is confined, the equal problem is confronted in low speed cornering to conquer this problem idea of four wheel guidance mechanism may be followed within the vehicle.

4 wheel steering reduce the turning radius of the car that's powerful in constrained area on this project 4 wheel steering is adopted to triumph over this troubles four wheel steering lessen the turning radius without changing the dimension of the automobile because of smaller turning radius automobile can be park without difficulty. vehicle can be without problems became at tight corner at the slim roads via the application of 4 wheel steerage of the rear wheels suppress sideways float of the car rear stop.

2. WHY FOUR WHEEL STEERING SYSTEM?

The four wheel steering is a technology that is to beneficial as it will increase the automobile's steering reaction time and facilitates hold the vehicle stable at higher speeds. With all four wheels steering, in preference to only the front two, this generation offers extraordinary manage and maneuverability

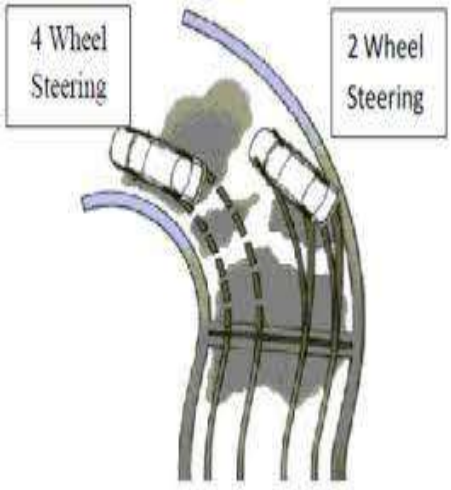
3. WHAT IS FOUR WHEEL STEERING?

4-wheel steer, 4WS, additionally referred as rear-wheel steering or all-wheel steering, Presents to actively steer the rear wheels throughout turning maneuvers. It improves dealing with and enables the automobile make tighter turns. Manufacturing-built vehicles have a tendency to beneath steer or, in few instances, over steer. The front wheels do maximum of the steering. Rear wheel turning is typically restrained to half all through an opposite route turn. Whilst each the front and rear wheels steer toward the identical route, they're stated to be in-segment and this produces a form of sideways movement of the car at low speeds. when the front and rear wheels are advised in opposite course, that is known as anti-section, counter-phase or opposite-segment and it produces a sharper, tighter flip. This venture goals

at developing a four Wheel steering system which could cater to the desires of humans. This system is employed to enhance steerage response, boom car balance while maneuvering at high velocity, or to decrease turning radius at low pace.

The front wheel guidance car. The front wheels begin to turn and a automobile's forward momentum is generates sidewise or cornering pressure at the front end. The rear tires have to attend until the front tires begin turning before they start to generate a corresponding pressure at the rear end. That is why automobile with two-wheel guidance end in the course of lane modifications the again give up is attempting to trap as much as the front. In excessive cases or underneath slippery conditions the rear of the automobile may also slide the rear end out of manipulate.

In a four-wheel-steer car, this high-velocity sway may be damped or even eliminated thru the use of equal-aspect steerage. whilst the rear wheels are grew to become at the equal time and inside the identical path because the front wheels, the lower back quit turns with the front, and the cornering forces arise at both axles simultaneously. The car slides easily to the facet without sway or fishtail.



4. FOUR WHEEL STEERING AT DIFFERENT SPEEDS

1) Low speed

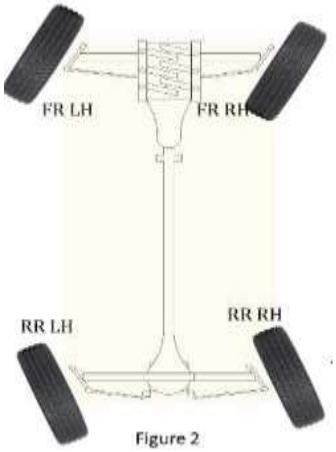


Figure 2

At slow Speeds rear wheels turn in direction contrary to that of front wheels. This mode is used for navigating through hilly areas and in congested metropolis in which better cornering is needed for U turn and tight streets with low turning circle which can be decrease.

2) High speed

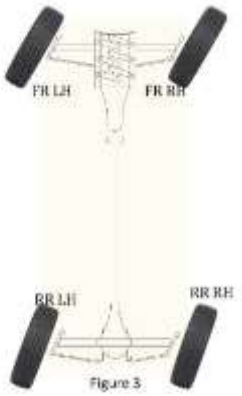
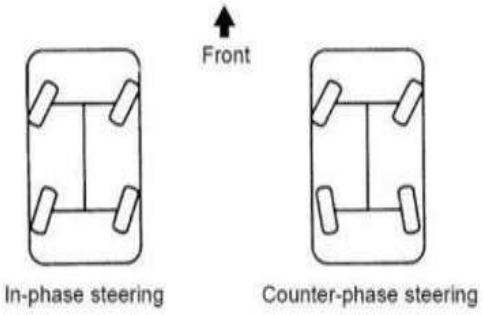


Figure 3

At excessive Speeds turning the rear wheels via an angle opposite to the front wheels may lead to vehicle instability and is for that reason fallacious. As a result the rear wheels are turned within the identical direction of front wheels in four-wheel steerage structures

3) In-phase and Counter phase turning



The 4WS machine performs awesome operations: in- segment steering, wherein the rear wheels are turned inside the same course because the front wheels, and counter phase guidance, wherein the rear wheels are became in the contrary route. The 4WS device is effective within the following conditions:

- Lane changes
- Slim Roads
- U-Turns
- Parallel Parking

5. OBJECTIVE OF PROJECT

The main objects of the present paper are:

1. To learn the different component used in steering system.
2. To learn how the vehicle is steered in conventional steering system.
3. To find out alternative way for steering a vehicle in an efficient way within a less turning radius and while parking a vehicle.
4. To know about how actually four wheel steering system works.
5. To save the area of turning and power applied by the driver.
6. To make the vehicle to turn in 360^0 by four wheel steering system.

6. ADVANTAGES & DISADVANTAGE

1) **Superior cornering balance:** The automobile cornering conduct turns into extra stable and controllable at excessive speed as properly as on moist slipping avenue surfaces.
2) **progressed guidance reaction and precision:** The automobile response to steering enter turns into faster and more specific in the course of the automobile input velocity

range.

3) **Progressed rapid lane-changing maneuvers:** that is stability in lane changing at high speed is improved. In high velocity type operation come to be simpler. The automobile is less in all likelihood to head into a spin even in conditions wherein the driver have to make a unexpected and comparatively huge change of course.
4) **Smaller turning radius:** with the aid of steerage the rear wheels within the length opposite the front wheels at low pace, the automobile's turning circle is greatly decreased. Consequently vehicle maneuvering on slim roads and for the duration of parking come to be simpler.

Disadvantage

1) The 4ws, due to creation of many new additives, the device becomes extra pricey.
2) The machine consists of as many components (specifically electronically) there may be usually a chance to get any of the components inactive, hence the system become in operative.
3) The machine isn't always solid at excessive velocity gets overpowered and topple in a few instances.
4) Pump and sensors need to be checked often to keep away from its failure.

7. APPLICATION

1) **Mild curve:** on mild curves, in phase steering of the rear wheels improves the car balance.
2) **Parking:** in the course of a parking a motors motive force normally turns the steerage wheels via a large angle to obtain a small turning radius. by means of counter section steering of the rear wheels, 4ws device realizes a smaller radius then is viable with 2ws. As a end result automobile is turned in small radius at parking.
3) **Junctions:** In a cross road or if there is any junction where in the road is at an intercepting angle of 90^0 degree or more in this case counter phase steering of back wheel cause the front and back wheel to follow in particular path at an certain angle that result automobile can be steer easily at junction
4) **Slippery street surfaces:** all through steering operation on snow, icy, muddy and different low friction surfaces, steering of the rear wheels suppress sideways float of the automobiles rear quit. As a result the motors course is less difficult to manipulate.
5) **U-turns:** By reducing the vehicle turning radius counter-phase steering of the rear wheel enables U-turn to be performed easily on narrow roads.

8. RESULT

The main motto of employing the four wheel steering system was to reduce the turning radius of the vehicle and to make the vehicle getting a turn in a very less or short area, this system was also developed by keeping this in mind. By employing this mechanism, we have successfully reduced the turning radius by approximately 50% to that of radius covered with two wheel steering system.

9. CONCLUSION

Four wheel steering is a technology that imposes maneuverability in cars, truck and trailer. In two wheel steering vehicles the set of rear wheel always directed to the forward so they do not play an active role in the controlling the steering. In four wheels steering system the rear wheel can turn left and right. To keep the driving in control as possible.

The aim of four wheel steering system is to give a better stability in changing the lane in high speed neutral behavior during cornering and reduce the turning radius of vehicle.

10. REFERENCES

[1] FOUR WHEEL STEERING SYSTEM FOR FUTURE Dilip S Choudhari. Vol. 3, No. 4, October 2014
[2] https://www.researchgate.net/publication/281450446_Study_of_4_Wheel_Steering_Systems_to_Reduce_Turning_Radius_and_Increase_Stability/link/55e8419008ae3e12184229f0
[3] Ansari Rehan, Rafiuddin Khan, Ansari Sarfaraz, Shoaib Sayyed, Shaikh Abid5, Karan K. Sharma Design & Synthesis of Four Wheel Steering Mechanism Volume 6, Issue 4 (April 2017), PP.17-20
[4] K. Lohith , Dr. S. R. Shankapal, M. H. Monish Gowda DEVELOPMENT OF FOUR WHEEL STEERING SYSTEM FOR A CAR Volume 12, Issue 1, April 2013
[5] Arun Singh * , Abhishek Kumar, Rajiv Chaudhary, R. C. Singh Study of 4 Wheel Steering Systems to Reduce Turning Radius and Increase Stability, vol-1, February 2014

