

Design and Analysis of Parallel Car Parking Using Fifth Wheel

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Abstract— In earlier methods of parking, the time taken is 2 minutes (approx), the driver needs to be more alert while parking in order to avoid hitting of the car during the reverse motion. Therefore, to avoid these inconveniences, a concept of parallel parking is made, where the total time will be 50 to 60 seconds. This parking can be done using an additional wheel (FIFTH WHEEL). Apneumatic cylinder and solenoid valve set up is used to control fifth wheel to land and lift. A DC motor enables the forward and reverse motion for the fifth wheel. A digital display is used to indicate the status of the wheel for the driver reference. It also helps to know malfunctions during landing or lifting of the wheel. This concept is mainly used for four-wheeler vehicles. This setup makes the vehicle to turn parallel in a significant angle with reference to the front axle within a short period. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

INTRODUCTION

Roads that facilitate parallel parking have an additional lane or an outsized shoulder for put cars. It's also used whenever parking facilities aren't accessible typically in giant metropolitan areas wherever there's a high density of vehicles and few (or restricted) accommodations like multi- keep automobile parks. Some jurisdictions have eliminated individual spots permitting shorter vehicles to use less area. Parallel parking could be a methodology of parking a vehicle in-line with different put vehicles. Parallel parking needs at first driving slightly past the auto mobile parking space, parallel to the put vehicle before of that area, keeping a secure distance, and so followed by reversing into that area. Later position adjustment could need the utilization of forward and reverse gears. Parallel parking is taken into account to be one in every of the toughest skills for brand new drivers to be told. Driving forward into a parking

space on the side of a road is typically not possible unless two successive parking spaces are empty.

Parking system:

A car parking system is a device that multiplies parking capacity inside a parking lot. Parking systems are generally powered by electric motor or hydraulic pumps that move vehicles into a storage position.



Parking System

Types of parking systems:

- Angle parking system,
- Perpendicular parking system,
- Parallel parking system,
- Smart parking system (automated parking),
- Multilevel car parking system,
- Hydraulic parking system.

Angle parking system:

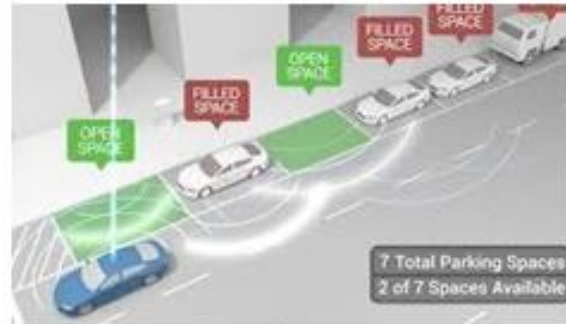
Normally the angle is aligned with the direction cars approach the parking space. It makes it a lot easier to

drive into the parking space in contrast to perpendicular parking, where the parking space is at a 90 degree angle. With angle parking there is a gentle r turn.



Angle Parking System

detect the presence or absence of a vehicle, signs direct incoming drivers to available locations.



Smart Parking System

Perpendicular parking system:

Perpendicular parking is a type of parking that requires cars to be parked side to side, perpendicular to an aisle or curb. This type of parking takes less space than parallel parking and is commonly used in parking lots and car garages.



Perpendicular Parking System

COMPONENTSUSED:

- Pneumatic cylinder
- Solenoid valve
- Track rod
- Tier od
- DC motor
- Battery
- Wheel
- Steering arm
- Frame
- Bearing
- Shaft
- gear
- Universal joint

Parallel parking system:

Parallel parking usually requires initially driving slightly past the parking space, parallel to the parked vehicle in front of that space, keeping a safe distance, then followed by reversing into that space.



Parallel Parking System

Pneumatic cylinder:

Pneumatic cylinder(s) (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage. Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement. For example, in the mechanical puppets of the Disney Tiki Room, pneumatics are used to prevent fluid from dripping onto people below the puppets.

Smart parking system:

A vehicle parking system that helps drivers find a vacant spot. Using sensors in each parking space that



Pneumatic Cylinder

Types of pneumatic cylinder:

- Single Acting Cylinders
- Double Acting Cylinders
- Telescoping Cylinders

Single acting pneumatic cylinder:

Single-acting pneumatic cylinder function Single acting pneumatic cylinders only work on one end of the piston, compared to the double acting pneumatic cylinder, which operates on both. The single-acting cylinder is most commonly used in internal engines, such as car engines. Single acting pneumatic cylinders are sometimes also found in pumps and hydraulic rams, helping with heavy duty jobs, such as lifting heavy materials.



Single Acting Pneumatic Cylinder

Double acting pneumatic cylinder:

Double-acting pneumatic cylinder function Double acting pneumatic cylinders operate on both ends of the piston, one element is used for the outstroke, while the other is used for in stroke. While single acting pistons are most commonly used in internal engines, double acting pistons can be found in machinery such as steam engines, which is known as an external engine. This is because double acting pneumatic cylinders produce force from both ends of the piston.



Double Acting Pneumatic Cylinder

Telescopic pneumatic cylinder:

Telescoping cylinders also known as telescopic cylinders, these pneumatic cylinders are available in both double and single acting varieties. They include a piston rod which, when activated, telescope as a segmented piston.



Telescopic Pneumatic Cylinder

Solenoid valve:

A solenoid valve is an electromechanical device used for controlling liquid or gas flow. The solenoid valve is controlled by electrical current, which is run through a coil. When the coil is energized, a magnetic field is created, causing a plunger inside the coil to move.

Pilot operated valve:

Solenoid Valve

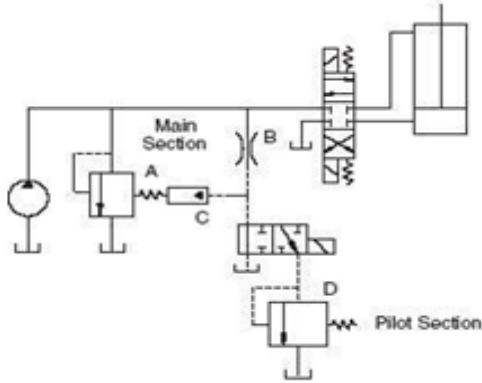


A pilot valve is a small valve that controls a limited-flow control feed to a separate piloted valve. Typically, this valve controls a high pressure or high flow feed. Pilot valves are often used in critical applications (i.e., emergency and safety controls) and are human-operated.



Pilot Operated Valve

The relief valve symbol designated with a letter “D” refers to the pilot stage of the valve (dart held in place with the pilot spring).



Pilot Operated Valve Graphical Sketch

Two way valve:

The purpose of a 2-way control valve is to shut off water flow or to control and regulate flow through a pipe. The 2-way valve is characterized by two ports. A 2-way valve can also be used as a shut-off valve. A 2-way valve can either be actuated manually or by electrical, pneumatic or thermal actuators.



Two Way Valve

Three way valve:

The purpose of a 3-way control valve is to shut off water flow in one pipe while opening water flow in another pipe, to mix water from two different pipes into one pipe.



Three Way Valve

Four way valve:

The four-way valve or four-way cock is a fluid control valve whose body has four ports equally spaced round the valve chamber and the plug has two passages to connect adjacent ports. The plug may be cylindrical or tapered, or a ball.



Four way valve

Direct acting valve:

A direct acting valve is one with a push down to close plug and seat orientation. A direct acting positioner or a direct acting controller outputs an increase in signal in response to an increase in set point. Direct Actuator is one in which the actuators the extends with an increase in diaphragm pressure.



Direct Acting Valve

Track rod:

A track rod is a rod that connects the steering arms of steered wheels. The track rod and steering arm of the car were bent. The rack is jointed to the wheel hubs by two track rods. The difference in movement of the inner and outer wheels is obtained by inclining the track rod arms.



Track Rod

Ensuring that a vehicle's wheels function in-sync, a track rod is what connects your car's two front wheels to each other. A track rod actually comprises two rods – an inner and an outer track rod. The inner rod is attached to the steering rack and pinion, while the outer rod is attached to the steering knuckle.

A track rod end is fitted at each end of the steering rack which is why it is so important. They enable you to steer your car smoothly. It incorporates a ball joint that attaches to the steering knuckle. The track rod end's ball joint enables movement up and down and from left to right.

Tie rod:

The tie rod is a part of the steering mechanism in a vehicle. A tie rod consists of an inner and outer end. The tie rod transmits force from the steering center link or rack gear to the steering knuckle. This will cause the wheel to turn. This adjustment is used to set a vehicle's alignment angle.



Tie Rod

Tie rods may be connected at the ends in various ways, but it is desirable that the strength of the connection should be at least equal to the strength of the rod. The ends may be threaded and passed through drilled holes or shackles and retained by nuts screwed on the ends. If the ends are threaded right- and left-hand the length between points of loading may be altered. This furnishes a second method for pre-tensioning the rod at will by turning it in the nuts so that the length will be changed. A turnbuckle will accomplish the same purpose. The ends may also be swaged to receive a fitting which is connected to the supports. Another way of making end connections is to forge an eye or hook on the rod.

DC motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.

Nearly all types of DC motors have some internal mechanism, either electro mechanical or electronic, to periodically change the direction of current flow in part of the motor.



DC Motor

Since each armature conductor is carrying current and is placed in the magnetic field, a mechanical force acts on it. On applying Fleming's left-hand rule, it is clear that force on each conductor is tending to rotate the armature in the anticlockwise direction. All these forces add together to produce a driving torque which sets the armature rotates.

Permanent Magnet DC Motors:

The permanent magnet motor uses a permanent magnet to create field flux. This type of DC motor provides great starting torque and has good speed regulation, but torque is limited so they are typically found on low horse power applications.



Permanent Magnet DC Motor

Series DC Motors:

In a series DC motor, the field is wound with a few turns of a large wire carrying the full armature current. Typically, series DC motors create a large amount of starting torque, but cannot regulate speed and can even be damaged by running with no load.

Shunt DC Motors:

In shunt DC motors the field is connected in parallel (shunt) with the armature windings. These motors offer great speed regulation due to the fact that the shunt field can be excited separately from the armature windings, which also offers simplified reversing controls.



Shunt DC Motor

Compound DC Motors

Compound DC motors, like shunt DC motors, have a separately excited shunt field. Compound DC motors have good starting torque but may experience control problems in variable speed drive applications. Between the 4 types of DC motors, the potential applications are numerous. Each type of DC motor has its strengths and weaknesses. Understanding these can help you understand which types may be good for your application.

Battery:

Batteries have three parts, an anode (-), a cathode (+), and the electrolyte. The cathode and anode (the positive and negative sides at either end of a traditional battery) are hooked up.



Battery

There are basically four major chemistries for rechargeable batteries;

- Lithium-ion(Li-ion)
- NickelCadmium(Ni-Cd)
- Nickel-MetalHydride(Ni-MH)
- Lead-Acid.



Battery and its parts

Wheel:

It is a circular object that revolves on an axle and is fixed below a vehicle or other object to enable it to move easily over the ground with the help of FWD AND 4WD.



Wheel

Wheel is a circular block of a hard and durable material at whose center has been bored a circular hole through which is placed an axle bearing about which the wheel rotates when a moment is applied by gravity or torque to the wheel about its axis, thereby making together one of the six simple machines.

When placed vertically under a load-bearing platform or case, the wheel turning on the horizontal axle makes it possible to transport heavy loads; when placed horizontally, the wheel turning on its vertical axle makes it possible to control the spinning motion used to shape materials (e.g. a potter's wheel); when mounted on a column connected to a rudder or a chassis mounted on other wheels, one can control the direction of a vessel or vehicle (e.g. a ship's wheel or steering wheel); when connected to a crank or engine, a wheel can store, release, or transmit energy (e.g. the fly wheel).

Fifth wheel:

It is a hitch that allows the driver to connect a cargo attachment to the back of a large vehicle, like a tractor or truck. Today, the fifth wheel refers to the "U" shaped coupling component found on the back of the towing vehicle, be it a large transport, pickup truck or tractor, for instance.

Steering arm:

A steering arm is the final part of a steering set up and pushes/pulls the hub's in order to gain directional control over the front wheels. Steering wheel spins column clockwise and anticlockwise as the driver sees fit in PAS. The column imparts this motion into a horizontal rack through means of a pinion.



Steering arm

The most conventional steering arrangement is to turn the front wheels using a hand-operated steering wheel which is positioned in front of the driver, via the steering column, which may contain universal joints (which may also be part of the collapsible steering column design), to allow it to deviate somewhat from a straight line. Other arrangements are sometimes found on different types of vehicles, for example, a tiller or rear-wheel steering.

Frame:

A frame is an edge or border that resembles a physical frame you would find around a picture. In data or network communications, a frame is a data transmission unit with a header to indicate the beginning of a block of data and a trailer to indicate the end of it.



Frame

If there is damage to the body, usually there will also be damage to the frame with respect to CCP. However, unibody frame damage is much easier to repair in modern vehicles than older vehicles.

Bearing:

A bearing is a device that is used to enable rotational or linear movement, while reducing friction and handling stress. Resembling wheels, bearings literally enable devices to roll, which reduces the friction between the surface of the bearing and the surface it's rolling over.



Bearing

The term "bearing" is derived from the verb "to bear" a bearing being a machine element that allows one part to support another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separated vices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.

Types of bearing:

- Plain bearing
- Rolling element bearing
- Jewel bearing
- Fluid bearing
- Magnetic bearing
- Flexure bearing.

Plain bearing:

Plain bearings are the simplest type of bearing and are composed of just the bearing surface with no rolling elements.



Plain Bearing

Rolling element bearing:

Rolling element bearings place balls or rollers between two rings – or “races” – that allows motion with little rolling resistance and sliding. These bearings include ball bearings and roller bearings.



Rolling Element Bearing

Shaft:

Shaft is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. The shaft may be hollow or solid. The shaft is supported on bearings and it rotates a set of gears or pulleys for the purpose of power transmission.



Shaft

A drive shaft is a cylindrical shaft that transmits torque from the engine to the wheels. They are most commonly found on rear-wheel drive vehicles and connect the rear of the transmission to the drive shaft.

Gear:

Gears are used for transmitting power from one part of a machine to another. Similarly, in a car, gears transmit power from the crankshaft (the rotating axle that takes power from the engine) to the drive shaft running under the car that ultimately powers the wheels.



Gear

Types of gear:

There are three major categories of gears in accordance with the orientation of their axes

- Parallel Axes/Spur Gear, Helical Gear, Gear Rack, Internal Gear.
- Intersecting Axes/Miter Gear, Straight Bevel Gear, Spiral Bevel Gear.

- Nonparallel, Non intersecting Axes/Screw Gear, Worm, Worm Gear (Worm Wheel).

Bevel gear:

Bevel gears are used in differential drives, which can transmit power to two axles spinning at different speeds, such as those on a cornering automobile. Bevel gears are used as the main mechanism for a hand drill.



Bevel gear

Spur gear:

They have straight teeth, and are mounted on parallel shafts. Sometimes, many spur gears are used at once to create very large gear reductions. Each time a gear tooth engages a tooth on the other gear, the teeth collide, and this impact makes a noise.



Spur gear

Universal joint:

Universal joints allow drive shafts to move up and down with the suspension while the shaft is moving so power can be transmitted when the drive shaft isn't in a straight line between the transmission and drive wheels.



Universal joint

A universal joint, otherwise called a u-joint, is found in many automotive applications, as well as in other mechanics. For example, a u-joint is used in vehicles

between the drive train bar and the transmission or axle where the bars meet at a right angle.

Multilevel parking system:

Multilevel car parking is a building designed for car parking and where there are a number of floors or levels on which parking takes place. It is essentially an indoor, stacked car park.



Multi Level Parking System

Illegal parking system:

The act of drivers parking vehicles in an illegal or restricted area such as fire zone, where signs are posted, in cross walks, on sidewalks, or blocking a fire hydrant as dictated by are a traffic laws.



Illegal Parking System

Hydraulic parking system:

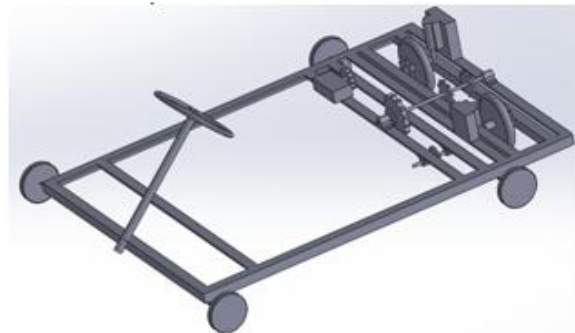
A car parking system is a mechanical device that multiplies parking capacity inside a parking lot. Parking systems are generally powered by electric motors or hydraulic pumps that move vehicles into a storage position.



Hydraulic Parking System

WORKING PRINCIPLE

The project is consists of steering rod, rack and pinion gears, pneumatic cylinder, solenoid valve fifth wheel and its supporting wheels. Vehicle steering is controlled by rack and pinion arrangement. Initially, when the driver finds a slot for parking, he can place the front axle of the car in any angle. When the driver pushes the button for the reversing, the solenoid valve actuates the pneumatic cylinder, this will land the fifth wheel on the road and slightly lifts the rear side of the vehicle. The fifth wheel is moved forward/reverse using a DC motor. After parking the vehicle in correct alignment, the fifth wheel is lifted when the cylinder retracts. Simultaneously, the driver gets the status of the process in the display kept in the dashboard of the car. This will helps to diagnose the problem during malfunction consists of three wheels. The center wheel runs with help of motor.



D view of the fifth wheel parking system

FIFTH WHEEL PARKING SYSTEM:

The power supply for the electronic components and switches are supplied from the battery. A driver is an electrical circuit or other electronic component used to control another circuit or other component, such as a high-power transistor. The driver circuit will allow you to drive a 12V relay using logic voltage. The circuit has its own 12V power supply making itself contained but the power supply portion can be left out if an external supply will be used. The circuit shows an output from the power supply that can be used to power other devices but it should be noted that the supply is unregulated and not particularly powerful with the parts stated. The 12V DC output is suitable for powering a few LEDs or low voltage lights but should not be used to power other electronic boards or motors.

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. Solenoid valves are the most frequently used to control the elements in fluidics. A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically.

The pneumatic cylinder is used to move the fifth wheel up and down. The supply is also given to the switches which is used to control the movement of the vehicle. The DC motor is used to make the fifth wheel rotation.

This parking can be done using an additional wheel (an Auxiliary Drive Wheel) most probably this will be a Stepney wheel. Initially, when the driver finds a slot for parking, he pushes the button and the DC motor actuate the movement of rack and pinion. Rack and pinion will applied force on the one side of triangular hub and due to the pivot point the triangular hub move in angular moment and other side of triangle will lift auxiliary wheel. This will land the auxiliary wheel on the road and slightly lifts the rear side of the vehicle. A rack and pinion and triangular hub setup is used to control an Auxiliary drive wheel to land and lift. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

Roads that facilitate parallel parking have an additional lane or an outsized shoulder for put cars. It's also used whenever parking facilities aren't accessible typically in giant metropolitan areas wherever there's a high density of vehicles and few (or restricted) accommodations like multi- keep automobile parks. Some jurisdictions have eliminated individual spots permitting shorter vehicles to useless area. Parallel parking could be a methodology of parking vehicle in-line with different put vehicles. Parallel parking needs at first driving slightly past the automobile parking space, parallel to the put vehicle before of that area, keeping a secure distance, and so followed by reversing into that area. Later position adjustment could need the utilization of forward and reverse gears. Parallel parking is taken into account to be one in every of the toughest skills for brand new drivers to be told. Parallel parking enables the driver to park a vehicle in a smaller space than would be true of forward parking.

Driving forward into a parking space on the side of a road is typically not possible unless two successive parking spaces are empty. Reversing into the spot via the parallel parking technique allows one to take advantage of a single empty space not much longer than the car. New drivers learn to use reference points to align themselves in relation to the car in front of the space, to determine the proper angle for backing, and to determine when to turn the steering wheel while backing.

They may find it easier to briefly stop at each reference point and turn for the next step. Two major types of parallel parking technique differ in whether they will use two or three positions of the steering wheel while backing. A skilled driver may be able to parallel park successfully by backing with the steering wheel turned all the way to the left and then immediately cranking the wheel all the way to the right at a critical point. For beginning drivers, those with larger cars or bad sight lines, this may risk collision with either the car in front of or behind the parking space, or it could also result in the car being parked too far away from the curb. Such drivers may find it easier to include an intermediate step, where after having achieved the ideal angle for backing up they back up with the wheels straight until the rear end of the car is far enough back to allow them to make their final reverse turn. While steering wheel positions in between full-right, straight, and full-left are possible to use, beginners may be able to gauge the progress more effectively by turning the wheel all the way to the right or left.

COMPONENTS & CALCULATION

LIST OF THE MATERIALS AND COST:

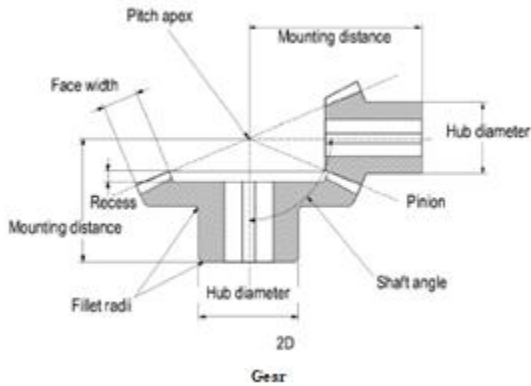
SI.NO	DESCRIPTION	QUANTITY	MATERIAL	COST(Rs)
1.	WHEEL	5	Rubber, nylon	12500
2.	DC MOTOR	1	Aluminium, Copper	7800
3.	UNIVERSAL JOINT	2	Stainless steel	300
4.	BATTERY	2	Lead acid battery	3800
5.	CONTROLLER	1	Aluminium	1700
6.	TIEROD	1	Iron	80
7.	PNEUMATIC CYLINDER	1	Aluminium	2200
8.	FRAME	1	Iron	1500
9.	BEARING	4	Stainless steel	240
10.	SHAFT	1	Iron	300
11.	BEVEL GEAR	1	Mild steel	400

12.	SPURGEAR	3	Steel	680
Total				31,500

DESIGNCALCULATION:

GEAR:

A gear is a kind of machine element in which teeth are cut around cylindrical or cone shaped surfaces with equal spacing. Also, they can be classified by shaft positions as parallel shaft gears, intersecting shaft gears, and non-parallel and non-intersecting shaft gears.



Straight bevel gear:

Definition:

Straight bevel gears are the simplest to produce and the most widely applied conical gear type. These gears have straight teeth cut along the pitch cone that if extended would intersect with the shaft axis.

Calculation:

Pinion - 18 teeth (Z1) Gear-44 teeth(Z2) $\theta=90^\circ$

Gear ratio, $i=Z2/Z1=44/18 =2.4d=mt*Z$

Diameter of pinion, $d1=4.4*18= 80\text{mm}$

Diameter of gear, $d2= 4.4*44 = 176 \text{ mm}$

Pitch angle for pinion and gear: $\delta1+\delta2=90^\circ \tan\delta2=2.4$

Pitch angle for gear,

$$\delta2=67^\circ 4'$$

$$\delta1+\delta2=90^\circ$$

$$\delta1=90-67^\circ 4'$$

Pitch angle for pinion, $\delta1=22^\circ 6'$

Cone distance, $R = 104.59 \text{ mm}$

Speed of pinion, $N1=2750\text{rpm}=N1/N2$

$$2.4=2750/N2$$

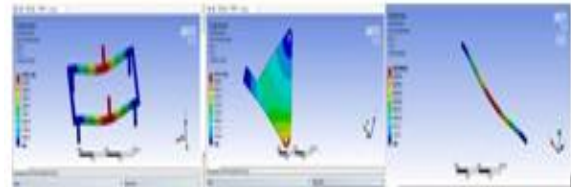
Speed of gear, $N2= 1146\text{rpm}$.

ANALYSIS AND FABRICATION

The designed one in the phase I is to be analysed and fabricated.

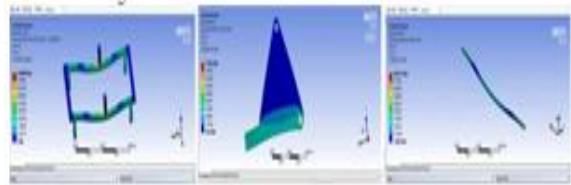
ANAYSIS:

- The purpose of the FEA is to check the design for failure before manufacturing stage.
- This helps to eliminate the defects in the design and reduced the cost and also helpful aesthetically and ergonomically
- Design engineers always go with this analysis and also easy for representation.



Total Deformation of Chassis, Shaft

3 Bending load condition total Deformation of the Chassis 4 shows the total deformation of the chassis and it indicates clearly that the deformation is maximum at the rear end of the chassis. The average value is 7mm.



Von- Mises stress of Chassis, Shaft

Von mises stress is used to predict yielding of materials under complex loading from the results of uniaxial tensile tests. The von mises stress satisfies the property where two stress states with equal distortion energy have an equal von mises stress.

FABRICATION:

Fabrication refers to the building of metal structures by assembling, bending, and cutting processes. It is a value-added process that involves creating machines, parts, and structures from raw materials.

Manufacturing process:

- Facing
- Drilling
- Turning
- Grinding
- Milling
- Knurling

This manufacturing process consists of many materials like steering rod, rack and pinion gears, pneumatic cylinder, solenoid valve fifth wheel and its supporting wheels. Vehicle steering is controlled by rack and pinion arrangement.

Initially, when the driver finds a slot for parking, he can place the front axle of the car in any angle. When the driver pushes the button for the reversing, the solenoid valve actuates the pneumatic cylinder, this will land the fifth wheel on the road and slightly lifts the rear side of the vehicle.

The fifth wheel is moved forward/reverse using a DC motor. After parking the vehicle incorrect alignment, the fifth wheel is lifted when the cylinder retracts. Simultaneously, the driver gets the status of the process in the display kept in the dashboard of the car. This will help to diagnose the problem during malfunction consists of three wheels. The center wheel runs with help of motor.

Therefore to avoid these inconveniences, a concept of parallel parking is made, where the total time will be 50 to 60 seconds. This parking can be done using an additional wheel (FIFTHWHEEL). A pneumatic cylinder and solenoid valve set up is used to control fifth wheel to land and lift. A DC motor enables the forward and reverse motion for the fifth wheel.

A digital display is used to indicate the status of the wheel for the driver reference. It also helps to know malfunctions during landing or lifting of the wheel. This concept is mainly used for four wheeler vehicles. This setup makes the vehicle to turn parallel in a significant angle with reference to the front axle within a short period. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

Two major types of parallel parking technique differ in whether they will use two or three positions of the steering wheel while backing. A skilled driver may be able to parallel park successfully by backing with the steering wheel turned all the way to the left (or right, in left-hand drive countries or when parking on the left side of a one-way street) and then immediately cranking the wheel all the way to the right (or left, in left-hand drive countries or when parking on the left side of a one-way street) at a critical point. For beginning drivers, those with larger cars or bad sight lines, this may risk collision with either the car in front of or behind the parking space, or it could also result in the car being parked too far

away from the curb. Such drivers may find it easier to include an intermediate step, where after having achieved the ideal angle for backing up they backup with the wheels straight until the rear end of the car is far enough back to allow them to make their final reverse turn. While steering wheel positions in between full-right, straight, and full-left are possible to use, beginners may be able to gauge their progress more effectively by turning the wheel all the way to the right or left. A 2009 Ruhr University Bochum study argued that a driver's gender may affect parking ability. According to the research, female drivers took an average of 20 seconds longer to park than male drivers, yet were still less likely than men to park accurately.

ADVANTAGES

- To obtain better parking in narrow space and at multiplexes.
- To obtain 0 to 360 degree turning with zero turning radius.
- Resolve Traffic Problems.
- Vehicle parking and driving in city conditions with heavy traffic in tight spaces.

RESULT AND CONCLUSION

A vehicle featuring low cost and user friendly steering mechanism for Auxiliary wheel has been introduced. This paper focused on a steering mechanism which offers feasible solutions to a number of current maneuvering limitations. A prototype for the proposed approach was developed by introducing separate mechanism for normal steering purpose and 360 degree steering purpose. This prototype was found to be able to be manoeuvred very easily in tight spaces, also making 360 degree steering possible.

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