

# **PERFORM PERIODIC MAINTENANCE OF STEERING SYSTEM**

After completing this module, you are expected to be capable of:

- List the common parts of a steering system as well as their roles.
- List the fundamental kinds of steering linkage systems.
- Determine the parts of a rack and pinion steering configuration and explain its purpose.
- Explain the purpose and workings of steering the steering column and the gearbox.
- Explain the different power-steering services and designs.
- Check the power-steering system in general
- Examine and maintain the components of the steering linkage.
- Power steering pumps should be inspected and maintained.
- Know the correct methods for maintaining and examining the steering system.
- Gain the knowledge and abilities necessary to identify and resolve typical steering problems.
- Highlight how crucial routine maintenance in maintaining the performance and safety of your car.

Turning the front wheels appears to be the steering system's primary function. But just as cars have evolved over time, so too have the needs for the steering system. The steering system now incorporates driver assistance features including lane departure control, self-parking, and semi autonomous operation in addition to moving the front wheels and, in certain situations, the rear wheels. Few cars had electric steering assistance or stability control systems until recently; now, the majority of cars have electrically assisted steering, and all new cars have some form of stability control.



## **1. Mechanical Steering System**

The steering linkage, gearbox, and driving columns and wheel are the three main subsystems that make up the steering system. The steering gear transmits motion to the driving linkage when the driver turns the steering wheel. The steering linkage controls the direction of the vehicle by turning the wheels. These three main assemblies are present in all steering systems, despite the fact that there are several variances.

### **Linkage for Steering**

The system of pivots and connecting components positioned between the steering arms and steering gear that are connected to the front or rear tires and regulate the direction of vehicle motion is referred to as a steering linkage. The steering linkage turns the wheels to move the vehicle by transmitting the gearbox's output shaft's motion to the steering arms. The portion of the steering knuckle that connects to the guiding linkage and curves in towards the center of the car is called the steering arms.



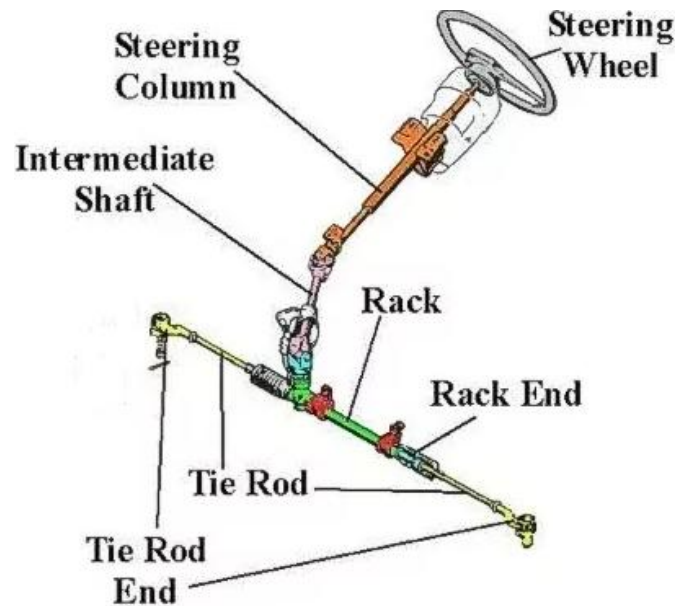
## 2. Tie-Rods Tie-rods and tie-rod assemblies

The last connections among the steering linkage and steering knuckles are made by tie-rods and tie-rod assemblies. Each end of the tie-rods of a parallelogram steering linkage has a ball socket assembly. The central link is connected to one end, while the steering arm is connected to the other. Tie-rod assemblies are made up of adjusting sleeves or bolts that join the inner and outer tie-rod ends. These allow the tier rod length to be adjusted for the proper toe settings absorber, but they are mounted across to the steering linkage, with one end attached to the center link and the other to the frame. Inner tie-rod ends are connected to both sides of the center link, while outer tie-rod ends are connected to the steering knuckles.



### 3. Rack and Pinion Steering Linkage

Compared to parallelogram steering, a rack and pinion has fewer parts and is lighter. Although the two systems use tie rods in the same way, that is where the similarities end. A pinion gear that is fixed to the steering column receives steering input. A toothed rack fastened to the tie-rods is moved by this gear.



### 4. Haltenberger and Cross Steer

Linkages: Cross steer or Haltenberger linkages are commonly used in vehicles with fixed front axles, front live axles, or dual I-beam suspensions. These linkage configurations substitute lengthy tie-rods, sometimes known as drag links, and a Pitman arm for parallelogram linkages. The front suspension may move thanks to these links without experiencing bump steer.

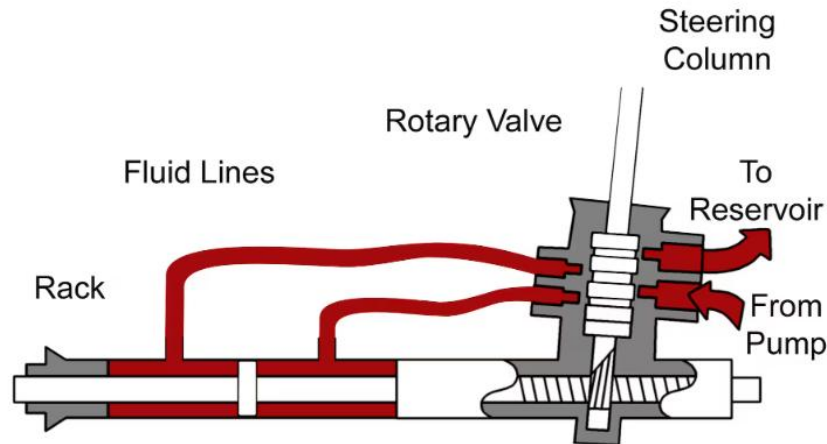
- **Pinion**

The steering wheel moves the pinion, which is a toothed or worm gear. When the pinion is turned, the rack is driven sideways by the pinion gear meshing with the teeth in the rack.

- **Rack**

A toothed bar housed in a metal housing makes up the rack. In order for the tie-rod movement to parallel control arm movement, the rack keeps the steering components at

the proper height. The rack and the parallelogram center link are comparable in that the tie-rods are pulled or pushed to change wheel directions by the rack's sideways movement within the housing.



## 5. Steering with power Systems

The purpose of the power-steering unit is to lessen the force needed to turn the steering wheel. Additionally, it lessens driver fatigue during lengthy trips and facilitates steering at low speeds, especially when parking. There are two different design configurations for power steering: conventional and nonconventional, or electronically controlled. In the traditional setup, the driver is assisted by hydraulic power. In the unconventional setup, steering power assistance is provided by an electric motor and computerized controls. Light-duty vehicles and passenger cars use a variety of power-steering systems. The integral-piston and power-assisted rack and pinion systems are the most widely used.

## 6. System of Integral Pistons

Conventional revolving ball power-steering systems employ the integrated piston mechanism. It is composed of steering gear, power-steering pressure and return lines, and a power-steering pump and reservoir. The steering gear housing houses both the power cylinders and the control valve.

- **Crankshaft pulleys and power-steering pump pulleys**

They are connected by belts, which power a large number of power-steering pumps. Serpentine belts are used in almost all late-model automobiles. All of the belt-driven components can be driven by this belt.

- **Electric Power Steering Pump**

Some cars have power steering pumps that run on electricity. One benefit is that the compressor can be switched off when it's not really needed, as when you're at a stop sign.



The steering mechanism is necessary for vehicle control so that the driver can efficiently operate the car. The steering wheel, driving column, steering gearbox, connections, and, in more recent models, power steering systems are among its essential parts. Periodic maintenance is essential to guarantee that these parts operate as intended and to prevent any safety risks.

### **Methods of Inspection**

- Start by visually examining the wheel linkage for indications of damage, wear, or cracks.
- Verify the steering wheel's play; too much play could be a sign of problems with the tie rods or steering gear.
- Check the quality and level of the power steering fluid. The system's functionality may be hampered by low or tainted fluid.

### **Lubrication and Modifications**

- As directed by the manufacturer, lubricate the steering linkage and ball joints.
- If the steering wheel is too firm or has too much free play, adjust the steering gearbox.

### **Solving Typical Problems**

- Check the tie rods' alignment and condition if the car pulls to one side.
- Unusual steering noises are frequently a sign of bearing or steering pump issues.

### **Maintenance of Power Steering**

- As advised by the manufacturer, flush your power steering fluid to avoid accumulation and corrosion.
- Check for wear and tension in the power steering belt. If required, replace.

### **Wrap-up/Conclusion**

For a car to be safe and work properly, the steering system must be maintained. A smooth and regulated driving experience is ensured by regular inspections, appropriate lubrication, and prompt troubleshooting, which assist avert possible breakdowns. Drivers can increase overall safety and prolong the lifespan of their vehicle's steering components by following the suggested maintenance schedule.

**Reference**

Smith, J. (2020). *Automotive Steering Systems: Maintenance and Repair*. New York, NY: AutoTech Publishing.