**Перевести текст:**

**Steering** is the collection of components, linkages, etc. which allows any [vehicle](https://en.wikipedia.org/wiki/Vehicle) ([car](https://en.wikipedia.org/wiki/Automobile), [motorcycle](https://en.wikipedia.org/wiki/Motorcycle), [bicycle](https://en.wikipedia.org/wiki/Bicycle)) to follow the desired course. An exception is the case of [rail transport](https://en.wikipedia.org/wiki/Rail_transport) by which [rail tracks](https://en.wikipedia.org/wiki/Rail_track) combined together with [railroad switches](https://en.wikipedia.org/wiki/Railroad_switch) (and also known as 'points' in British English) provide the steering function. The primary purpose of the steering system is to allow the driver to guide the vehicle.

Many modern cars use [rack and pinion](https://en.wikipedia.org/wiki/Rack_and_pinion) steering mechanisms, where the steering wheel turns the pinion gear; the pinion moves the rack, which is a linear gear that meshes with the pinion, converting circular motion into linear motion along the transverse axis of the car (side to side motion). This motion applies steering [torque](https://en.wikipedia.org/wiki/Torque) to the swivel pin [ball joints](https://en.wikipedia.org/wiki/Ball_joint) that replaced previously used [kingpins](https://en.wikipedia.org/wiki/Kingpin_%28mechanics%29) of the stub axle of the steered wheels via [tie rods](https://en.wikipedia.org/wiki/Tie_rod) and a short [lever](https://en.wikipedia.org/wiki/Lever) arm called the steering arm.

The rack and pinion design has the advantages of a large degree of feedback and direct steering "feel". A disadvantage is that it is not adjustable, so that when it does wear and develop [lash](https://en.wikipedia.org/wiki/Backlash_%28engineering%29), the only cure is replacement.

[BMW](https://en.wikipedia.org/wiki/BMW) began to use rack and pinion steering systems in the 1930s, and many other European manufacturers adopted the technology. American automakers adopted rack and pinion steering beginning with the 1974 [Ford Pinto](https://en.wikipedia.org/wiki/Ford_Pinto).[[1]](https://en.wikipedia.org/wiki/Steering#cite_note-1)

Older designs use two main principles: the [worm and sector](https://en.wikipedia.org/wiki/Worm_and_sector) design and the screw and nut. Both types were enhanced by reducing the friction; for screw and nut it is the [recirculating ball](https://en.wikipedia.org/wiki/Recirculating_ball) mechanism, which is still found on trucks and utility vehicles. The steering column turns a large screw which meshes with nut by recirculating balls. The nut moves a sector of a gear, causing it to rotate about its axis as the screw is turned; an arm attached to the axis of the sector moves the [Pitman arm](https://en.wikipedia.org/wiki/Pitman_arm), which is connected to the [steering linkage](https://en.wikipedia.org/wiki/Linkage_%28mechanical%29#Types_of_linkages) and thus steers the wheels. The recirculating ball version of this apparatus reduces the considerable friction by placing large ball bearings between the screw and the nut; at either end of the apparatus the balls exit from between the two pieces into a channel internal to the box which connects them with the other end of the apparatus, thus they are "recirculated".

The recirculating ball mechanism has the advantage of a much greater [mechanical advantage](https://en.wikipedia.org/wiki/Mechanical_advantage), so that it was found on larger, heavier vehicles while the rack and pinion was originally limited to smaller and lighter ones; due to the almost universal adoption of [power steering](https://en.wikipedia.org/wiki/Power_steering), however, this is no longer an important advantage, leading to the increasing use of rack and pinion on newer cars. The recirculating ball design also has a perceptible lash, or "dead spot" on center, where a minute turn of the steering wheel in either direction does not move the steering apparatus; this is easily adjustable via a screw on the end of the steering box to account for wear, but it cannot be entirely eliminated because it will create excessive internal forces at other positions and the mechanism will wear very rapidly. This design is still in use in trucks and other large vehicles, where rapidity of steering and direct feel are less important than robustness, maintainability, and mechanical advantage.

The worm and sector was an older design, used for example in Willys and Chrysler vehicles, and the Ford Falcon (1960s). To reduce friction the sector is replaced by a roller or rotating pins on the rocker shaft arm.

Generally, older vehicles use the recirculating ball mechanism, and only newer vehicles use rack-and-pinion steering. This division is not very strict, however, and rack-and-pinion steering systems can be found on British sports cars of the mid-1950s, and some German carmakers did not give up recirculating ball technology until the early 1990s.

Other systems for steering exist, but are uncommon on road vehicles. Children's toys and [go-karts](https://en.wikipedia.org/wiki/Go-kart) often use a very direct linkage in the form of a [bellcrank](https://en.wikipedia.org/wiki/Bellcrank%22%20%5Co%20%22Bellcrank) (also commonly known as a [Pitman arm](https://en.wikipedia.org/wiki/Pitman_arm)) attached directly between the steering column and the steering arms, and the use of cable-operated steering linkages (e.g. the [capstan and bowstring](https://en.wikipedia.org/wiki/Capstan_and_Bowstring) mechanism) is also found on some home-built vehicles such as [soapbox cars](https://en.wikipedia.org/wiki/Soapbox_car) and [recumbent tricycles](https://en.wikipedia.org/wiki/Recumbent_tricycle).