THE MINISTRY OF THE REPUBLIC OF UZBEKISTAN AND SECONDARY EDUCATION

ANDIJAN MACHINE-BUILDING INSTITUTE

THE CHAIR OF LANGUAGES

Transmission

Theme: «_____»

Faculty**:** **Automatics and Electrotechnology**

Direction: **Mengment and automation of technological process of production**

Course **2-2**

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How the transmission works

Constant velocity joint

The joint is designed to cope simultaneously with drive and steering action on front-wheel-drive cars.

Driving through a propeller shaft

In a front-engined rear-wheel-drive car, power is transmitted from the engine through the clutch and the gearbox to the rear axle by means of a tubular propeller shaft.

The rear axle must be able to move up and down on the suspension according to variations of the road surface.

The movement causes the angle of the propeller shaft, and the distance between the gearbox and the rear axle, to change constantly.

To allow for the constant movement, splines on the front end of the propeller shaft slide in and out of the gearbox as the distance changes; the shaft also has universal joints at each end, and sometimes in the middle.

The universal joints allow the propeller shaft to be flexible, while constantly transmitting power.

The last part of the transmission is the final drive, which incorporates the differential and is sometimes called the differential.

The differential has three functions: to turn the direction of drive through 90 degrees to the rear wheels; to allow either rear wheel to turn faster than the other when cornering; and to effect a final gear reduction.

A pinion gear inside the differential is driven by the propeller shaft and has its gears bevelled - cut at an angle. It meshes with a bevelled crown wheel so that the two gears form a 90 degree angle.

Front engine - rear drive
The engine and the gearbox are bolted together, with the clutch between them.
The engine is rigidly mounted, but the propellor shaft must be flexible to allow for movement of the back axle.

The crown wheel usually has about four times as many teeth as the pinion gear, causing the wheels to turn at a quarter the propeller-shaft speed.

The drive is transmitted from the differential to the rear wheels by means of half shafts, or drive shafts.

At the differential end of each half shaft, a bevelled pinion gear is connected to the crown wheel by means of an intermediate set of bevel pinions.

Driving through the front wheels

Front-wheel-drive cars use the same transmission principles as rear-wheeldrive cars, but the mechanical components vary in design according to the engine and gearbox layout.

Transverse engines are normally mounted directly above the gearbox, and power is transmitted through the clutch to the gearbox by a train of gears.

In-line engines are mated directly to the gearbox, and drive passes through the clutch in the normal manner.

In both cases, drive passes from the gearbox to a final-drive unit.

In a transverse-mounted engine, the final-drive unit is usually located in the gearbox. In an in-line engine, it is usually mounted between the engine and the gearbox.

Engine mountings

Power is taken from the final-drive unit to the wheels by short drive shafts. To cope with suspension and steering movement in the wheels, the drive shafts use a highly developed type of universal joint called a constant-velocity (CV) joint.

A CV joint uses grooves with steel ball bearings in them instead of the `spider' found in a universal joint, and transmits power at a constant speed, regardless of the angle and the distance between the final-drive unit and the wheels.

Some cars, such as earlier Minis, also have drive-shaft couplings which are 'spider' joints, and do the same job as universal joints in rear-wheel-drive cars, allowing up-and-down movement of the suspension. They are usually made of rubber bonded to metal.

Rear engine driving rear wheels

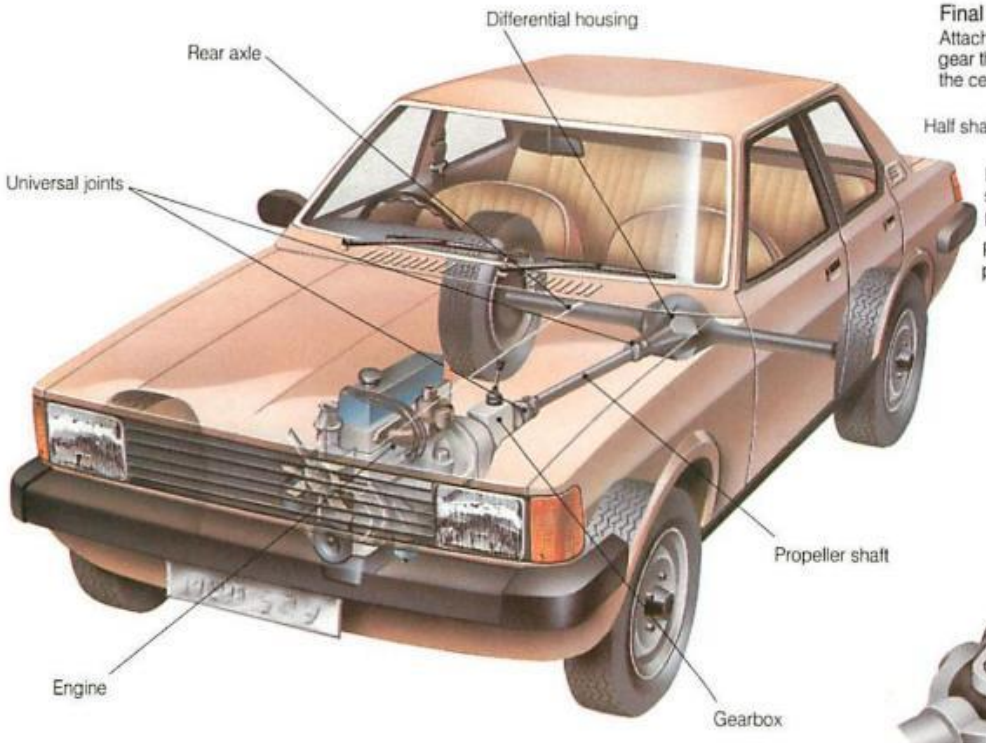
Some cars, such as VW Beetles and smaller Fiats, have rear-mounted engines and gearboxes, driving the rear wheels.

Power is transmitted through the clutch to the gearbox, passing to the wheels through drive shafts.

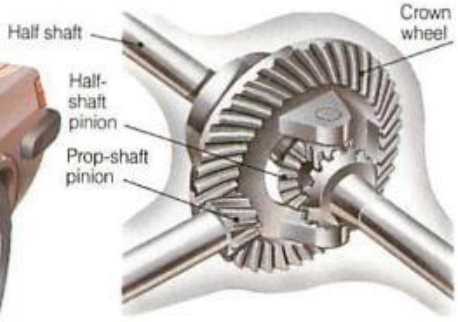
The layout is similar to some frontwheel-drive cars, except that no allowance need be made for steering movement of the wheels.

Sometimes the shafts are connected to the flanges at the gearbox by `doughnut' couplings.

The shafts and flanges are bolted on either side of the couplings, and drive is transmitted through the flexible rubber.

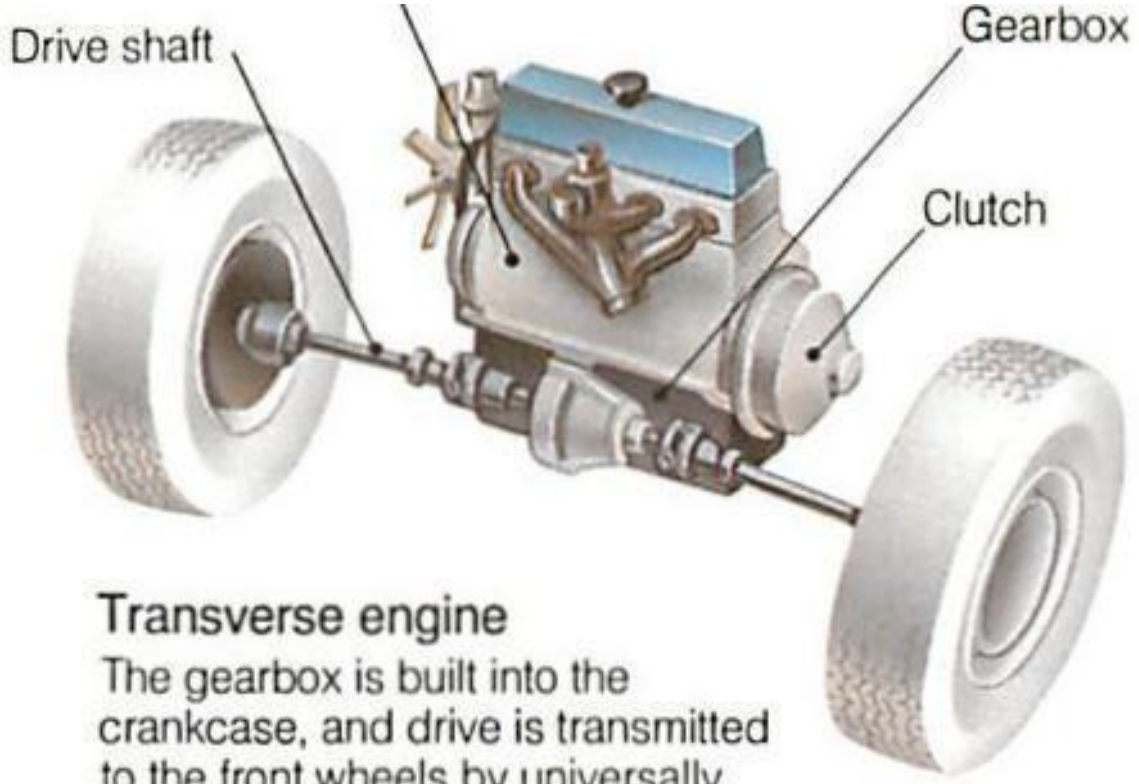


Final drive
Attached to the propeller shaft is a pinion gear that enters the differential housing in the centre of the rear axle.



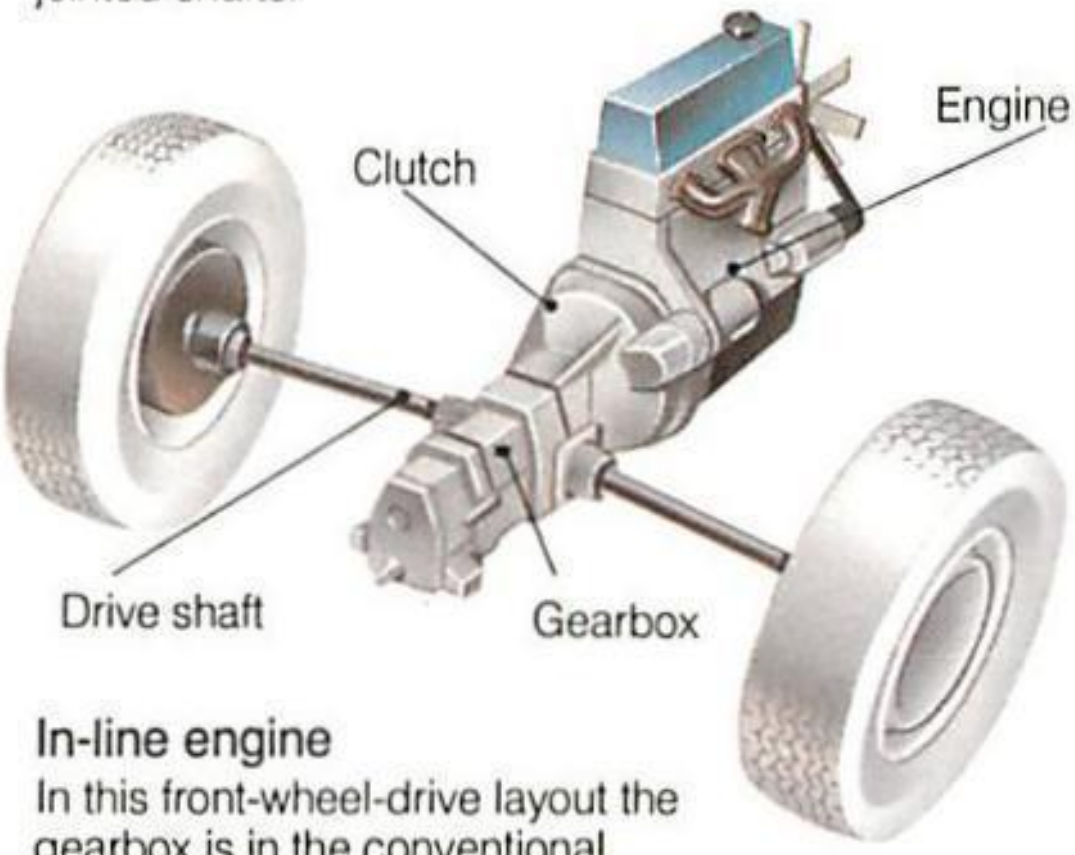
The differential
Bevelled pinion gears inside the differential turn with the crown wheel and drive the half shafts to the rear wheels, usually both at the same speed. During cornering, they allow one road wheel to turn faster than the other.

Universal joint
The commonest type of universal joint, the Hooke joint, uses a cross-shaped 'spider' across the axis of the drive shaft. The



Transverse engine

The gearbox is built into the crankcase, and drive is transmitted to the front wheels by universally jointed shafts.



In-line engine

In this front-wheel-drive layout the gearbox is in the conventional position, at the rear of the engine.