



# Gears and Mechanical Components

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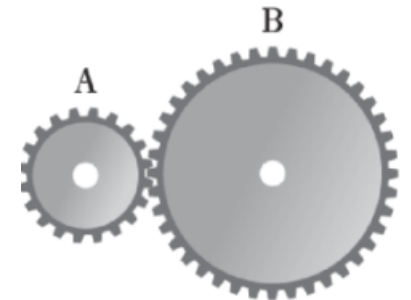
# Gears

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Gear trains are used to transfer and transform rotational motion.

They are used when a change in speed or torque of a rotating device is needed.

When two gears in mesh the larger gear wheel is called the spur (or crown wheel), the smaller is called the pinion.



# Types of Gears

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- Spur Gear
- Helical Gear
- Worm Gear
- Rack and Pinion



# Spur Gears

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A spur gear is a type of cylindrical gear with straight teeth that are cut parallel to the axis of rotation.

They are the simplest and most common type of element in mechanical drive systems.

Spur gears can increase or decrease the speed and torque of the rotating shaft depending on the sizing and arrangement of the gears.



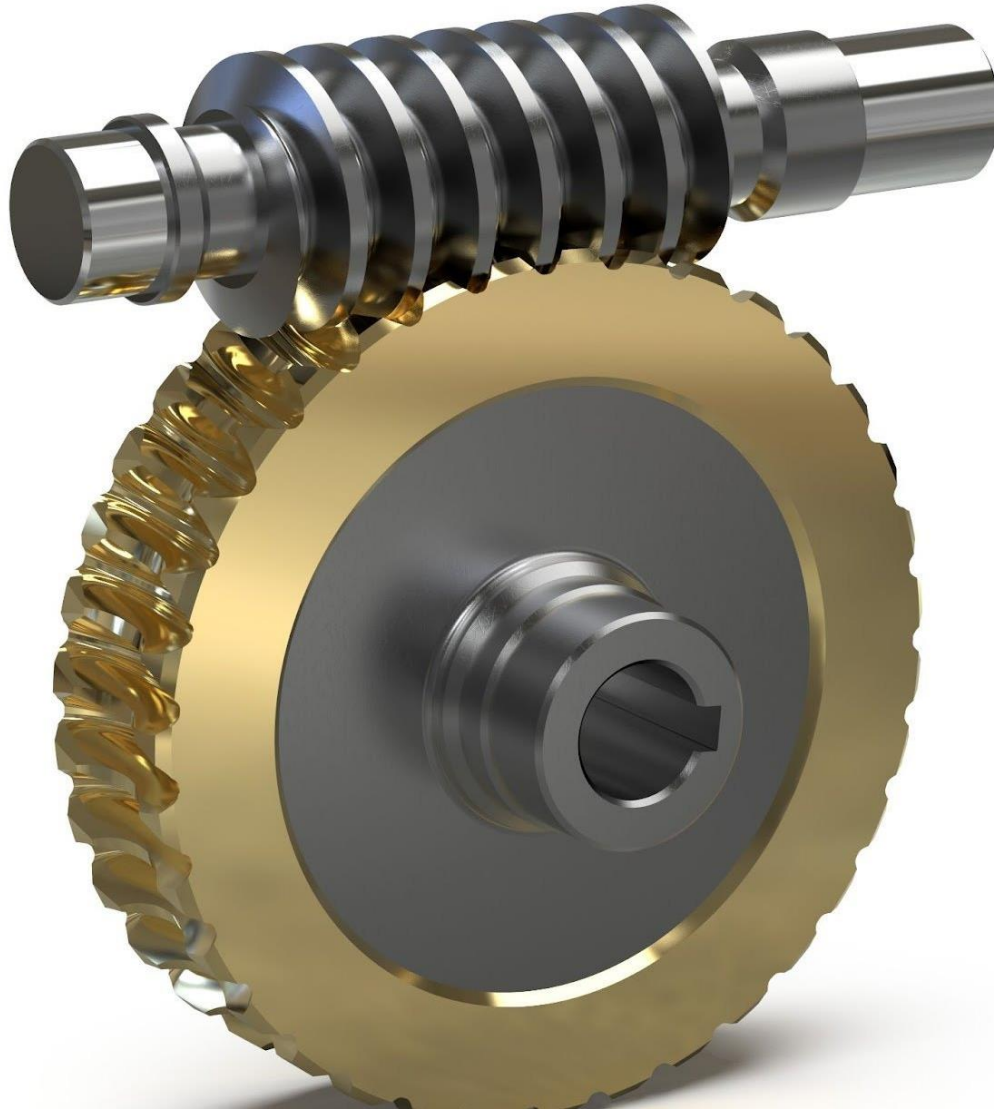
# Helical Gears

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Helical gears are similar to spur gears except that their teeth are cut at an angle to the hole (axis) rather than straight and parallel to the hole like the teeth of a spur gear.

The line of contact between two teeth is not parallel to the teeth but inclined.

They have the advantage of smoother drive and prolonged life of gears,



# Worm Gears

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A worm gear is used for transmitting power between two non-parallel and non-intersecting shafts.

Worm gears can be used to either greatly increase torque or greatly reduce speed.

A worm is similar to a screw and a worm gear is similar to a nut.

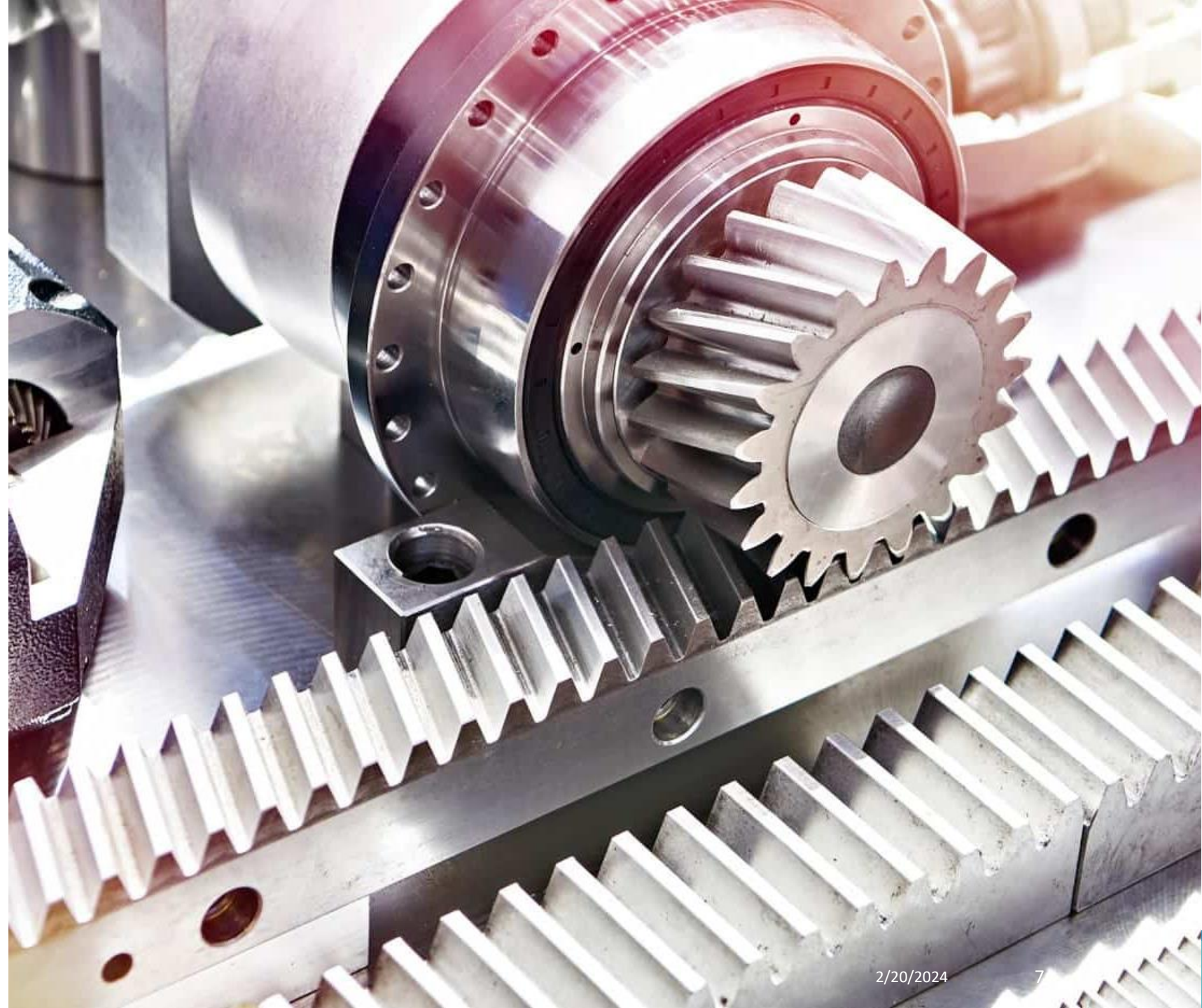
# Rack and Pinion

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Rack and pinion is a type of linear actuator that converts rotational motion into linear motion.

It consists of a linear gear (the rack) and a circular gear (the pinion).

It is useful in various applications, including steering systems in automobiles, CNC machines, and robotics.



# Types of Gear Trains

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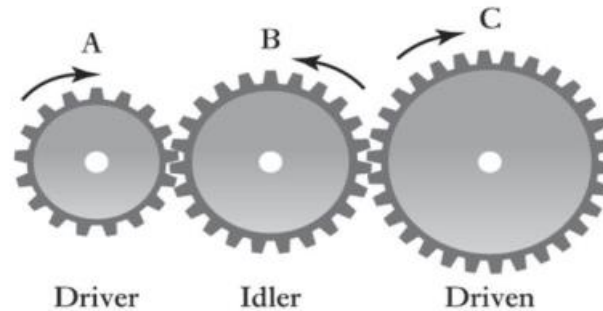
- Simple Gear Train
- Compound Gear Train
- Planetary Gear Train



# Simple Gear Train

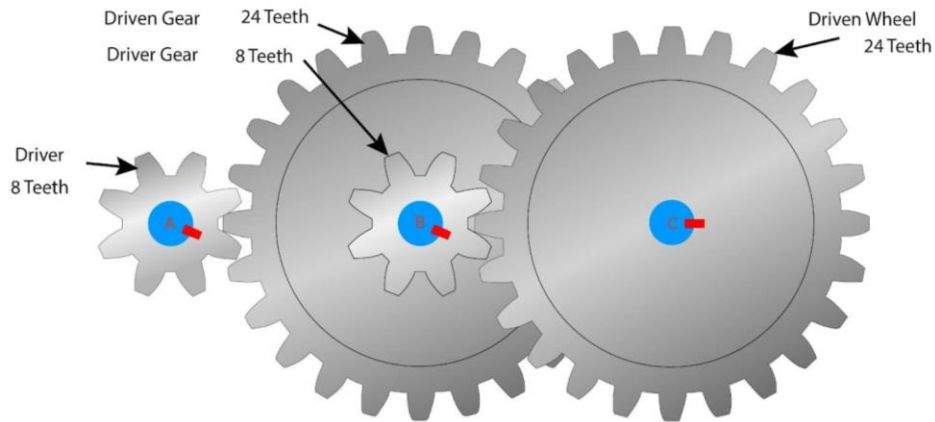
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Consists of two or more gears meshed together with each gear mounted on its own shaft. It transmits motion from one shaft to another.

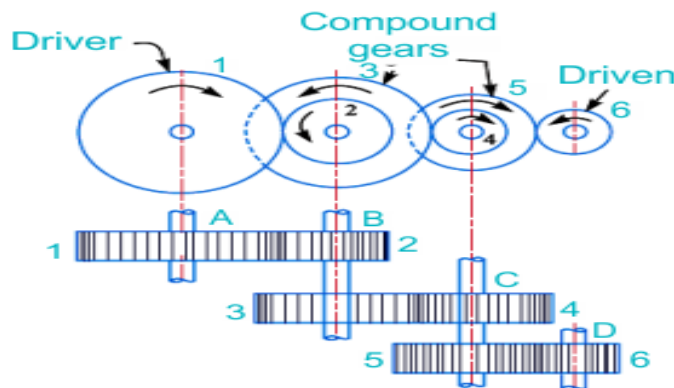


The intermediate wheel B is termed the idler wheel is used to change the direction of rotation of the output wheel.

# Compound Gear Train

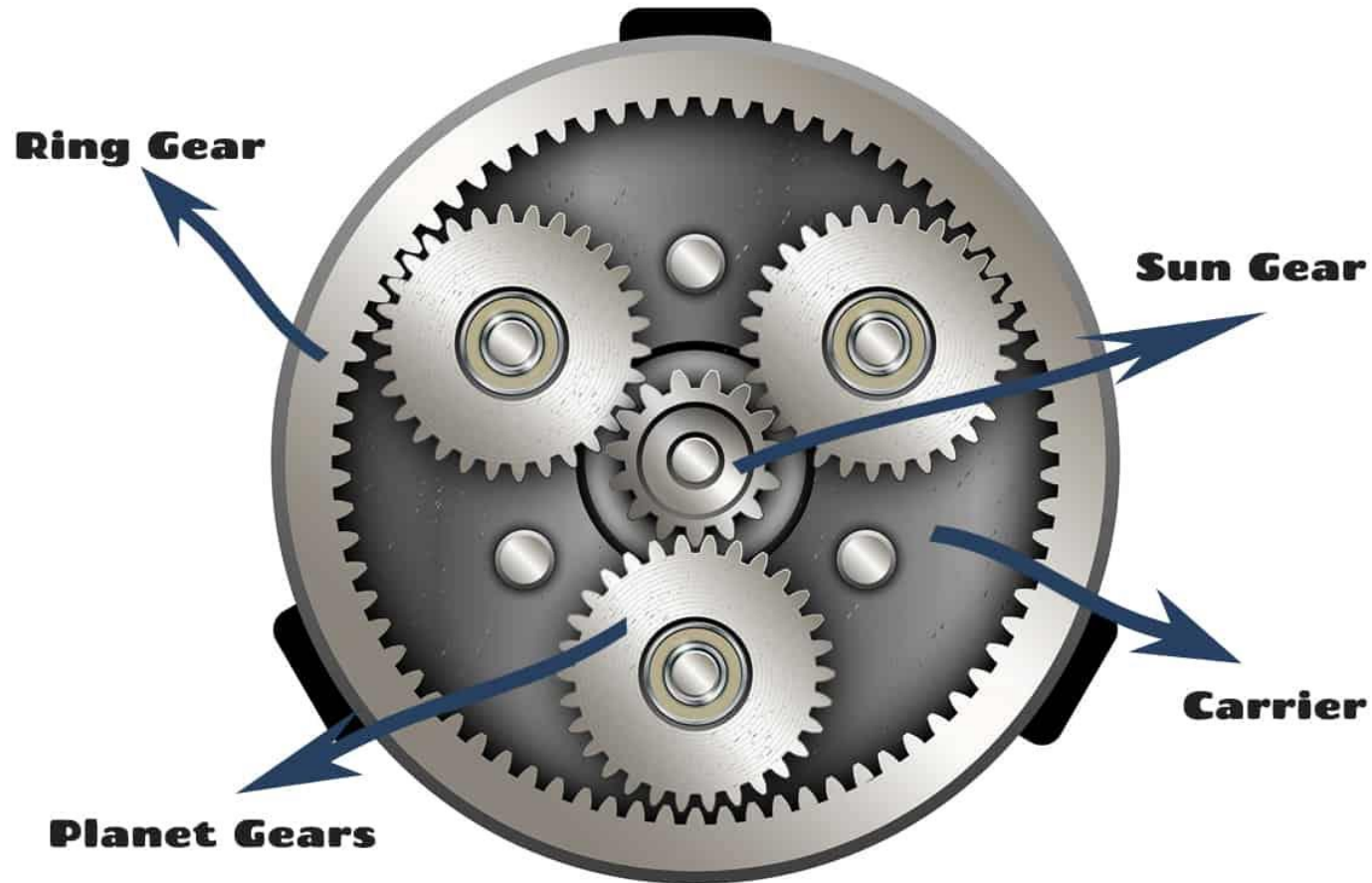


In the compound gear train shown, there are two driven gears connected to different shafts, B and C. The angular velocity of the driver gear for shaft B and the one for shaft C is the same.



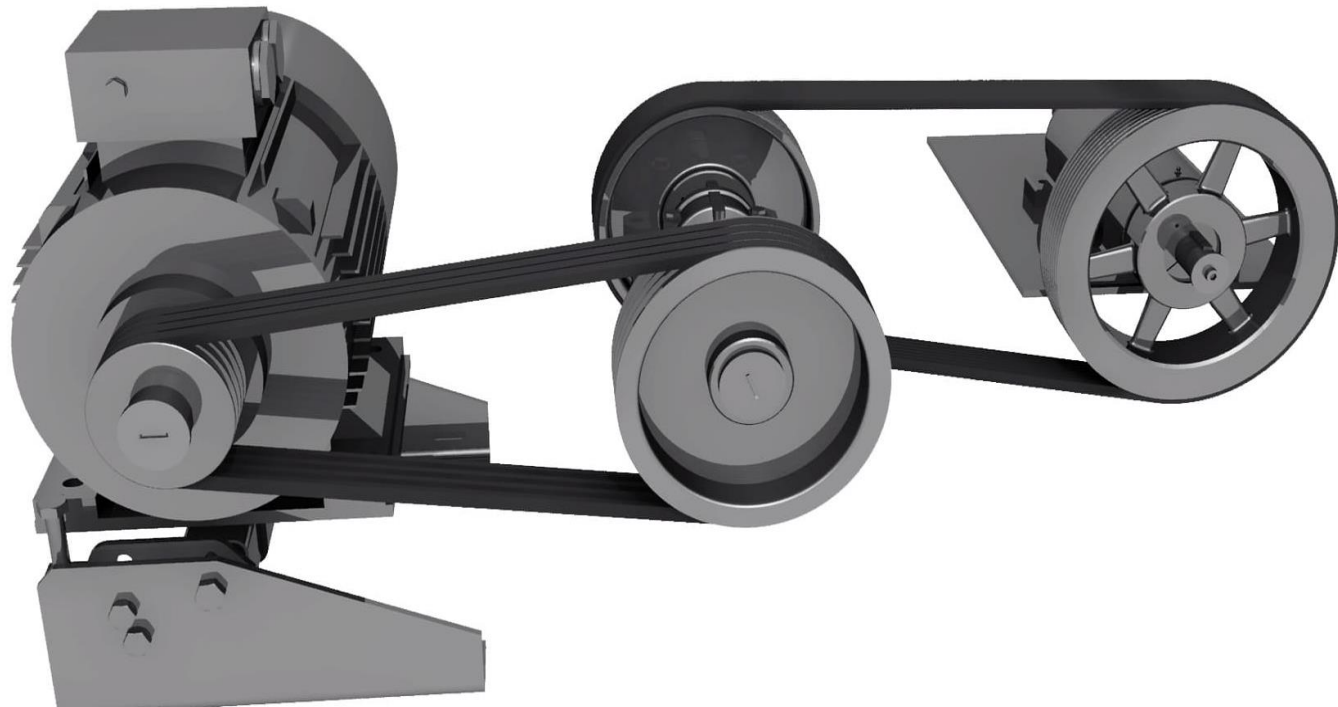
Combines two or more simple gear trains in series, where the output shaft of one gear train becomes the input shaft of another.

# Planetary Gear Train



Consists of a central gear (sun gear), an outer ring gear (ring gear), and one or more gears (planet gears) that rotate around the central gear.

This type of gear train offers high gear reduction in a compact space and is commonly used in automotive transmissions, industrial machinery and wind turbines.



# BELT Drives

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Belt is a flexible mechanical element that transmits power from one shaft to another.

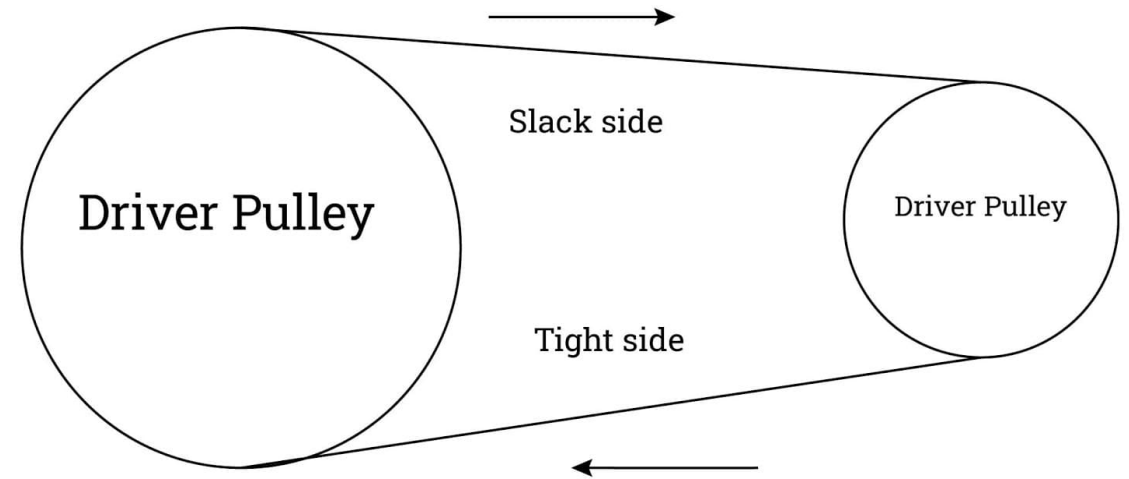
Example: Sewing machine and automotive

# Criteria

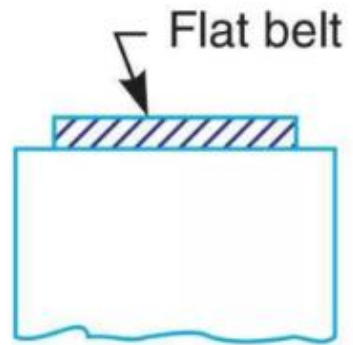
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Amount of power transmitted by belt depends on:

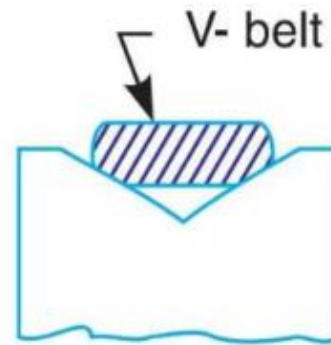
- The velocity of the belt
- The tension of the belt
- The arc contact between the belt and smaller pulley



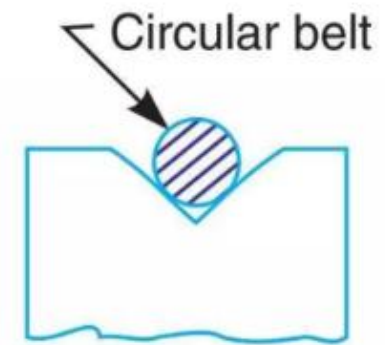
# Belt Type



(a) Flat belt.



(b) V-belt.



(c) Circular belt.



# Chain Drives

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Slip can be prevented by the use of chains which lock into teeth on the rotating cylinders.

The drive mechanism used with bicycle and motorbike is an example of a chain drive.

It enables a number of shafts to be driven by single wheel and so give a multiple drive



QUESTIONS

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