

# GEAR DRIVE TRAIN



TEAM:16

SEC:4



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## .INTRODUCTION(PROJECT INFORMATION)

A **gear train** or **gear set** is a machine element of a mechanical system formed by mounting two or more gears on a frame such that the teeth of the gears engage.

Gear teeth are designed to ensure the pitch circles of engaging gears roll on each other without slipping, providing a smooth transmission of rotation from one gear to the next. Features of gears and gear trains include:

- The **gear ratio** of the pitch circles of mating gears defines the speed ratio and the mechanical advantage of the gear set.
- A planetary gear train provides high gear reduction in a compact package.

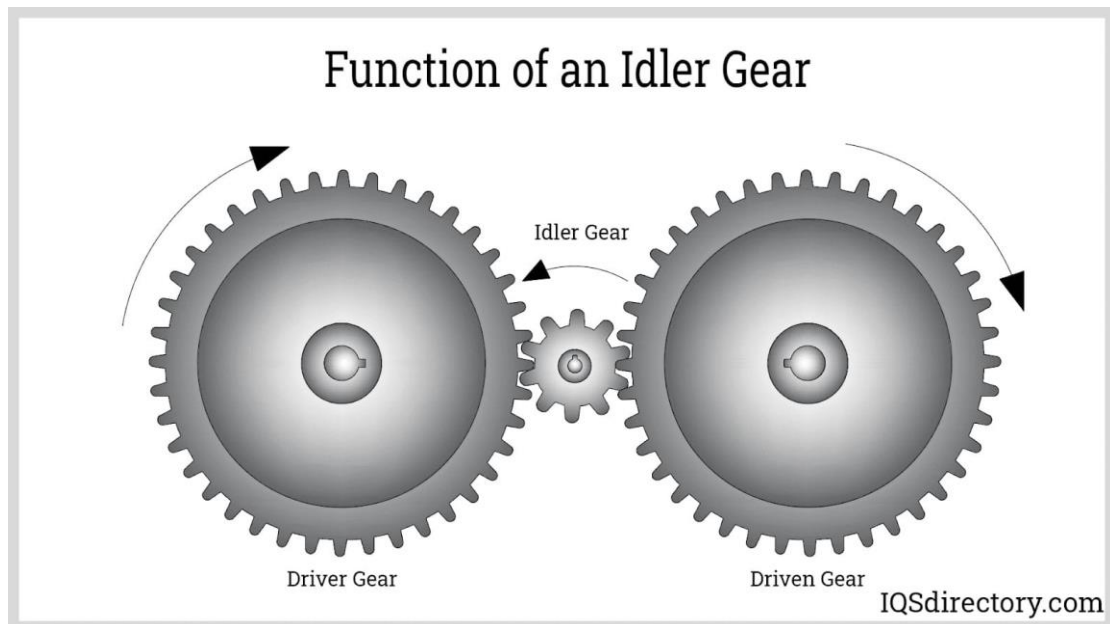
It is possible to design gear teeth for gears that are non-circular, yet still transmit torque smoothly.

- The speed ratios of chain and belt drives are computed in the same way as gear ratios. See bicycle gearing.

The transmission of rotation between contacting toothed wheels can be traced back to the Antikythera mechanism of Greece and the south-pointing chariot of China. Illustrations by the Renaissance scientist Georgius Agricola show gear trains with cylindrical teeth. The implementation of the involute tooth yielded a standard gear design that provides a constant speed ratio.

## **.DEFINITION OF GEAR DRIVE**

Sometimes, two or more gears are made to mesh with each other to transmit power from one shaft to another. Such a combination is called gear train or train of toothed wheels. The nature of the train used depends upon the velocity ratio required and the relative position of the axes of shafts. A gear train may consist of spur, bevel or spiral gears.



# .TYPES OF GEAR TRAIN

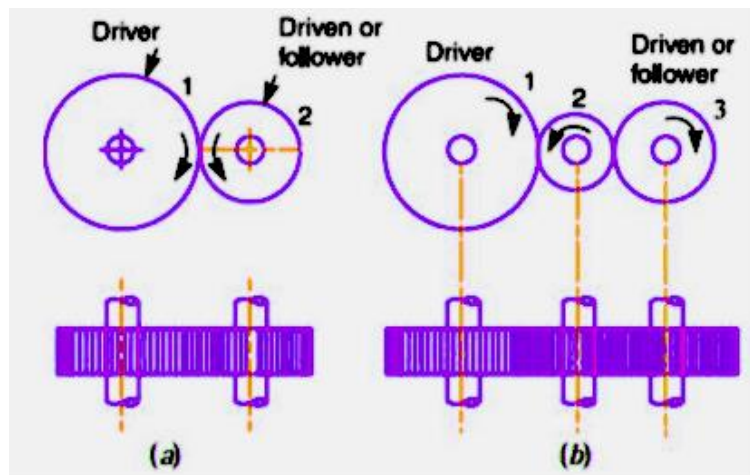
Following are the different types of gear trains. depending upon the arrangement of wheels:

- 1- Simple gear train.
- 2- Compound gear train.
- 3- Reverted gear train.
- 4- Epicyclic gear train.

In the first three types of gear trains, the axes of the shafts over which the gears are mounted are fixed relative to each other. But in case of epicyclic gear trains, the axes of the shafts on which the gears are mounted may move relative to a fixed axis.

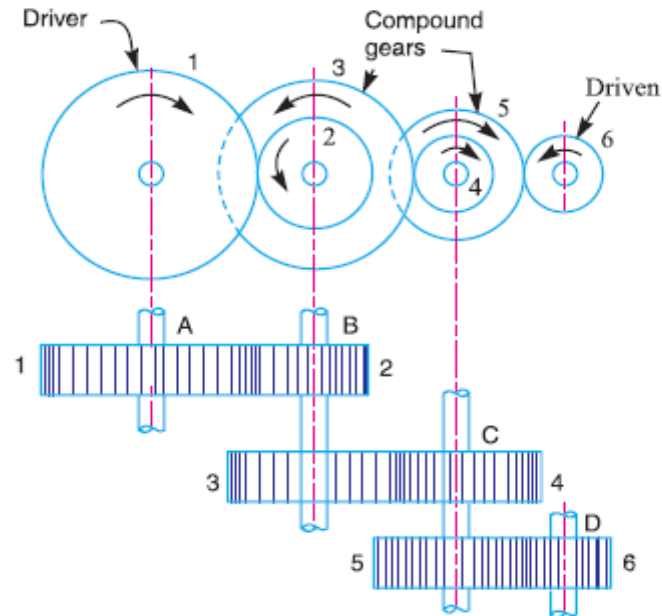
## 1- SIMPLE GEAR TRAIN.

When there is only one gear on each shaft.



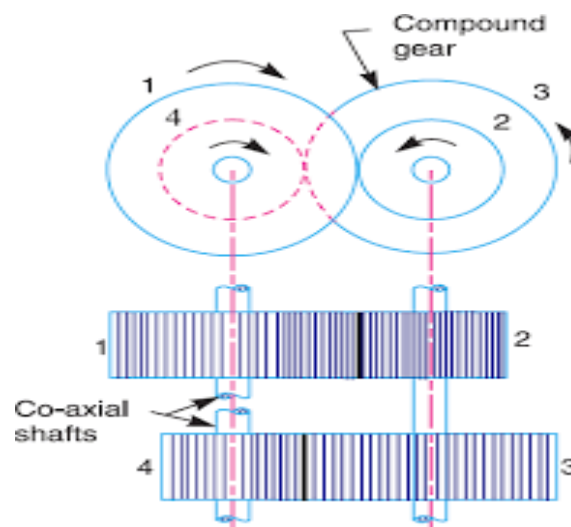
## 2- COMPOUND GEAR TRAIN.

When there are more than one gear on a shaft.



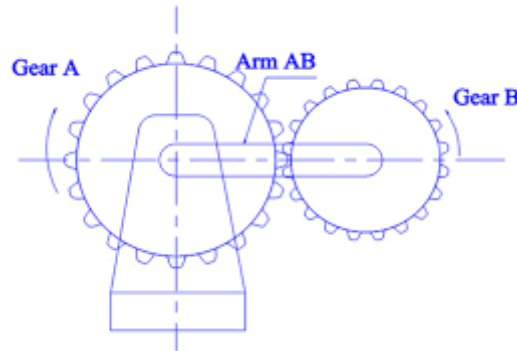
## 3- REVERTED GEAR TRAIN.

When the axes of the first gear (i.e. first driver) and the last gear (i.e. last driven or follower) are co-axial.



## 4- EPICYCLIC GEAR TRAIN.

In an epicyclic gear train, the axes of the shafts, over which the gears are mounted, may move relative to a fixed axis.



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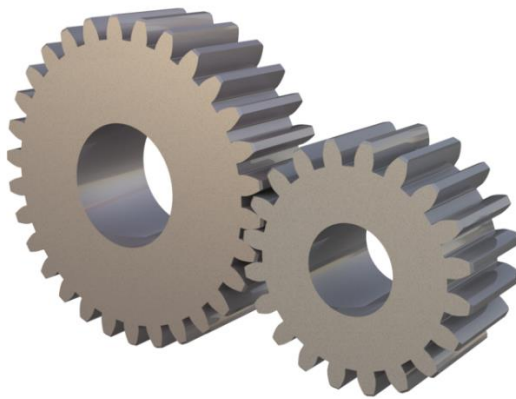
## . TYPES OF TOOTHED GEARS

- .spur gear
- .spiral gear
- .Helical gear
- .External gear
- .internal gear
- .Rack and pinion gear



## 1-SPUR GEAR.

Gears having cylindrical pitch surfaces are called cylindrical gears. Spur gears belong to the parallel shaft gear group and are cylindrical gears with a tooth line which is straight and parallel to the shaft. Spur gears are the most widely used gears that can achieve high accuracy with relatively easy production processes. They have the characteristic of having no load in the axial direction (thrust load). The larger of the meshing pair is called the gear and smaller is called the pinion.



## 2-SPIRAL GEAR

Is a bevel gear with helical teeth. The main application of this is in a vehicle differential, where the direction of drive from the drive shaft must be turned 90 degrees to drive the wheels. The helical design produces less vibration and noise than conventional straight-cut or spur-cut gear with straight teeth.



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### 3-HELICAL GEAR

Helical gears are used with parallel shafts similar to spur gears and are cylindrical gears with winding tooth lines. They have better teeth meshing than spur gears and have superior quietness and can transmit higher loads, making them suitable for high speed applications. When using helical gears, they create thrust force in the axial direction, necessitating the use of thrust bearings. Helical gears come with right hand and left hand twist requiring opposite hand gears for a meshing pair.



#### 4-EXTERNAL GEAR

A gear whose teeth are made on the outside of a cylinder or cone is called an external gear. When a pair of external gears mesh with each other, the direction of rotation of these external gears is reversed.



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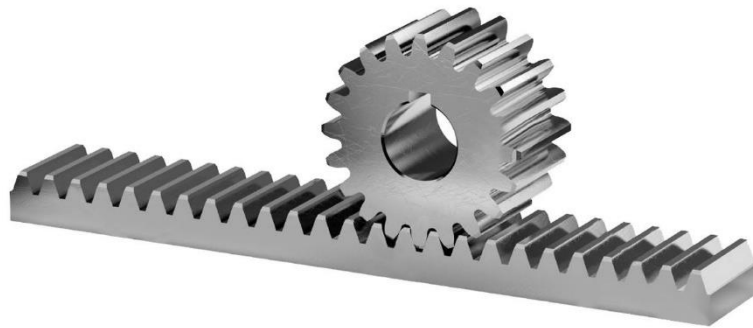
#### 5-INTERNAL GEAR

Internal gear is a gear with its teeth cut in the internal surface of a cylinder and meshes with spur gears.

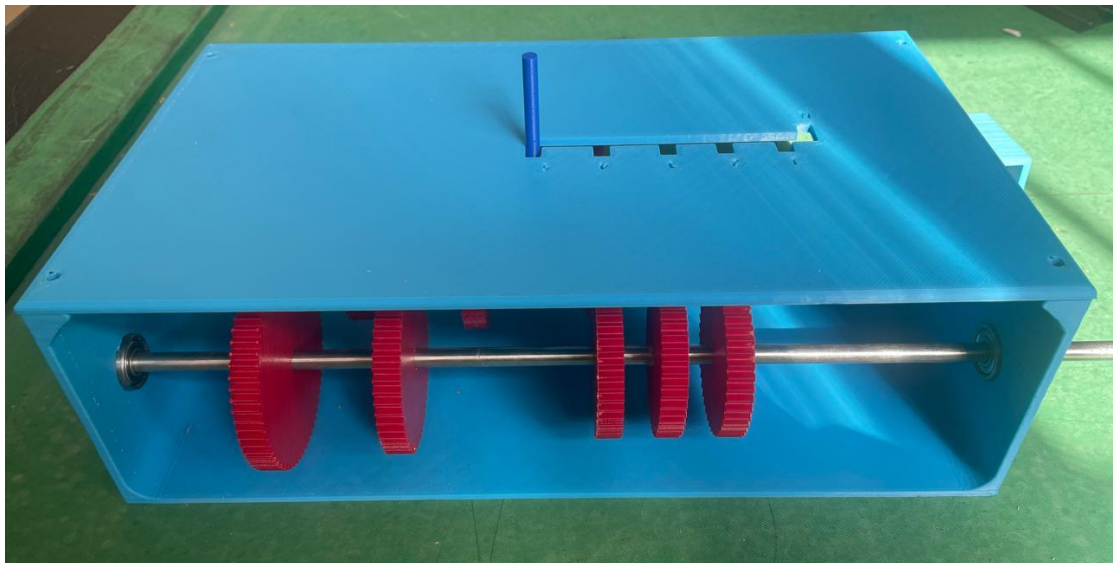
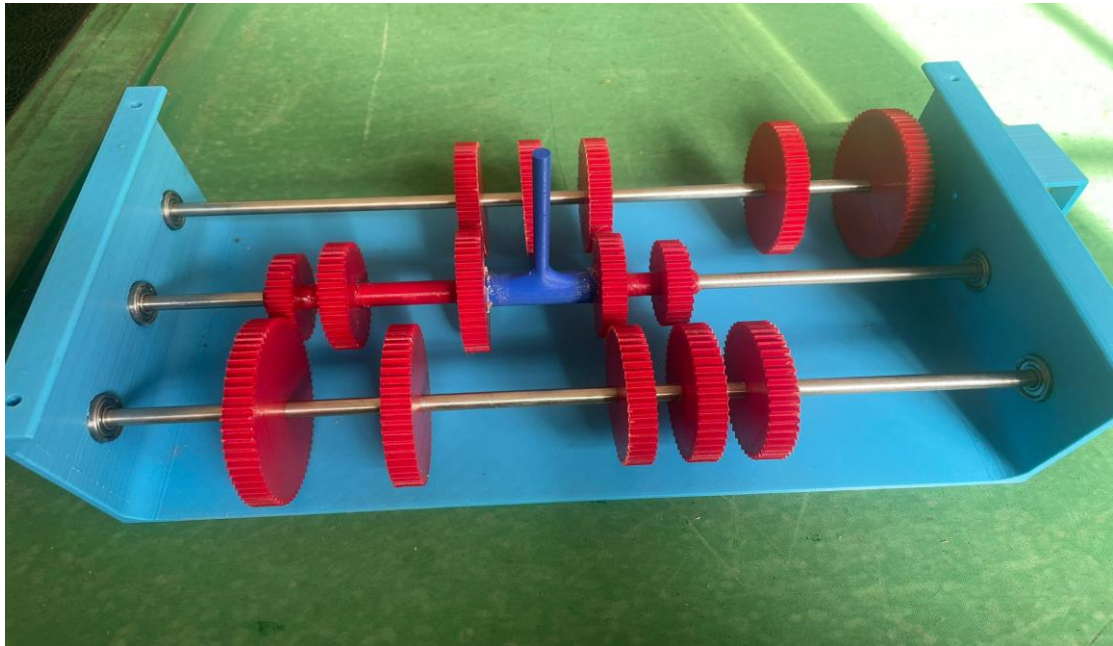


## 5-RACK AND PINION GEAR

Same sized and shaped teeth cut at equal distances along a flat surface or a straight rod is called a gear rack. A gear rack is a cylindrical gear with the radius of the pitch cylinder being infinite. By meshing with a cylindrical gear pinion, it converts rotational motion into linear motion. Gear racks can be broadly divided into straight tooth racks and helical tooth racks, but both have straight tooth lines. By machining the ends of gear racks, it is possible to connect gear racks end to end.



## .PHOTO OF REAL MECHANISM



## .DRAWING OF PARTS

