

DAR ES SALAAM INSTITUTE OF TECHNOLOGY



MACHINE ELEMENT ASSIGMENT

STUDENT'S NAME: FREDY SIMON

ADMISSION NO: 190530523546

CLASS: GC-19-MECHANICAL ENGINEERING

DEPARTMENT: MECHANICAL ENGINEERING

GEAR

Gear is a rotating machine part having cut teeth or in case of a cogwheel inserted teeth which is called cogs which meshed with another toothed part so that to transmit torque. Geared devices can change the speed, torque and direction of the power source. Gears almost always produces a change in torque, creating the mechanical advantage, through their gear ratio and it is considered to as simple machine.

Gears are used to transfer motion and torque between machine components in mechanical devices. Depending on the construction of the gear pair employed, gears can change the direction of the movement and also can increase the output speed or torque. There are different types of gear which are following .

1. Spur gear

This is the gear that transmit power through shafts that are parallel. The teeth of spur gears are parallel to the shaft axis. This causes the gear to produce radial reaction loads on the shaft but not axial loads. Spur gears tend to be noisier than helical gears because they operate with a single line of contact between teeth. Spur gear can be used to increase or to decrease torque or power of a given object. Spur gears are used in this effect in washing machines, blenders, construction equipment, fuel pumps and mills.



2. Helical gears

Helical gears have teeth that are oriented at an angle to the shaft, this is unlike to spur gear which are parallel. This causes more than one tooth to be in contact during operation and helical are capable of carrying more load than spur gears also due to the load sharing between teeth, this arrangement also allow helical gears to operate smoother and quieter than spur gears. Helical gears are mostly used in transmissions, they also generates large amounts of thrust and use bearings to help support the thrust load.



3. Double helical gear.

Double helical gears are a variation of helical gears in which two helical faces are placed next to each other with a gap separating them. Each face has identical but opposite helix angles. Employing a double helical set of gears eliminates thrust loads and offers the possibility of even greater tooth over lap

and smoother operations. like the helical gears, double helical gears are commonly used in enclosed gear drives.



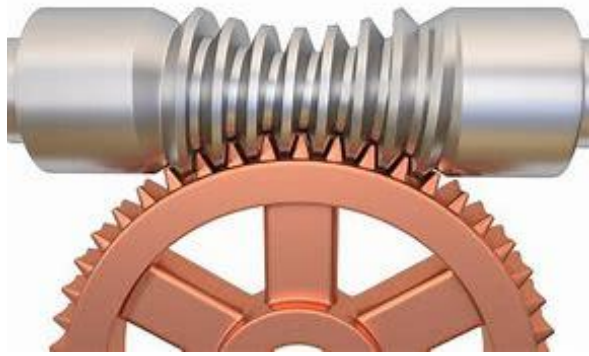
4. Herringbone gear.

Herringbone gears are very similar to the double helical gears but they do not have the gap separating the two helical faces. These gears are typically smaller than the comparable double helical and are ideally suited for high shock and vibrations application. Herringbone gearing is not used very often due to their manufacturing difficulties and high cost.



5. Worm gear.

Worm gears transmit power through right angle on non intersecting shafts. Worm gears produce thrust load and are good high shock load applications but offers very low efficiency in comparison to the other gears. Due to this low efficiency they are often used in lower horsepower applications.



6.Bevel gear.

Bevel gears most commonly used to transmit power between shafts that intersect at a 90 degree angle. They are used in applications where a right angle gear drive is required ,bevel gears are generally more more costly and are not able to transmit as much torque per size as a parallel shaft arrangement.



PUMPS

Is a mechanical device used to transfer liquids from one point to another by imparting energy supplied by a prime mover to the liquid. The prime mover can be electric motor, an IC engine or a steam engine or turbine. The power required depends on the quantity of the quantity of the liquid.

Types of pumps

Pumps are classified into two types namely Dynamic pumps as well as Positive Displacement Pumps.

Dynamic Pumps

Dynamic pumps are classified into different types but some of them are discussed below like Centrifugal, Vertical centrifugal, Horizontal centrifugal, Submersible, and Fire hydrant systems.

1). Centrifugal Pumps

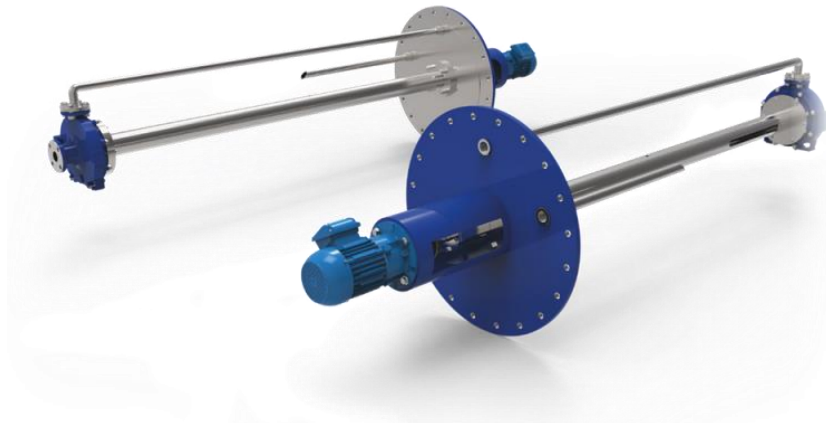
These types of pumps are most commonly used worldwide. The working is very simple, described well and carefully tested. This pump is strong, efficient and fairly cheap to make.



Centrifugal Pumps

2). Vertical Centrifugal Pumps

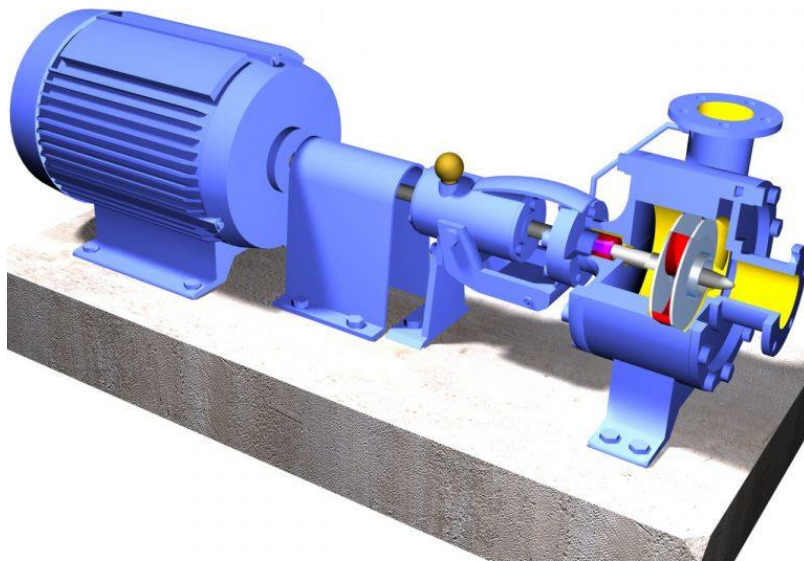
Vertical centrifugal pumps are also called as cantilever pumps. These pumps use an exclusive shaft & maintain design that permits the volume to fall within the pit as the bearings are external to the pit



Vertical Centrifugal Pumps

3). Horizontal Centrifugal Pumps

These types of pumps include a minimum of two otherwise more impellers. These pumps are utilized in pumping services. Every stage is fundamentally a divide pump.



Horizontal Centrifugal Pumps

All the phases are in a similar shelter & mounted on a similar shaft. On a solo horizontal shaft, minimum eight otherwise additional stages can be mounted. Every stage enhances the head by around an equal amount. Multi-stage pumps can also be single otherwise

double suction on the first impeller. All kinds of pumps have been providing as well as servicing this type of centrifugal pumps.

4). Submersible Pumps

These pumps are also named as stormwater, sewage, and septic pumps. The applications of these pumps mainly include building services, domestic, **industrial**, commercial, rural, municipal, & rainwater recycle applications.



Submersible Pumps

These pumps are apt for shifting storm water, subsoil water, sewage, black water, grey water, rainwater, trade waste, chemicals, bore water, and foodstuffs. The applications of these pipes mainly include in different impellers like closed, contra-block, vortex, multi-stage, single channel, cutter, otherwise grinder pumps. For different applications, there is an extensive selection is accessible which includes high flow, low flow, low head, otherwise high head.

5). Fire Hydrant Systems

Fire hydrant pump systems are also named as hydrant boosters, fire pumps, & fire water pumps. These are high force water pumps intended to enhance the capacity of fire fighting of construction by increasing the force within the hydrant service as mains is not sufficient. The applications of this system mainly include irrigation as well as water transfer.



Fire Hydrant Systems

Positive Displacement Pumps

Positive displacement pumps are classified into different types but some of them are discussed below like diaphragm, gear, peristaltic, lobe, and piston pumps.

1). Diaphragm Pumps

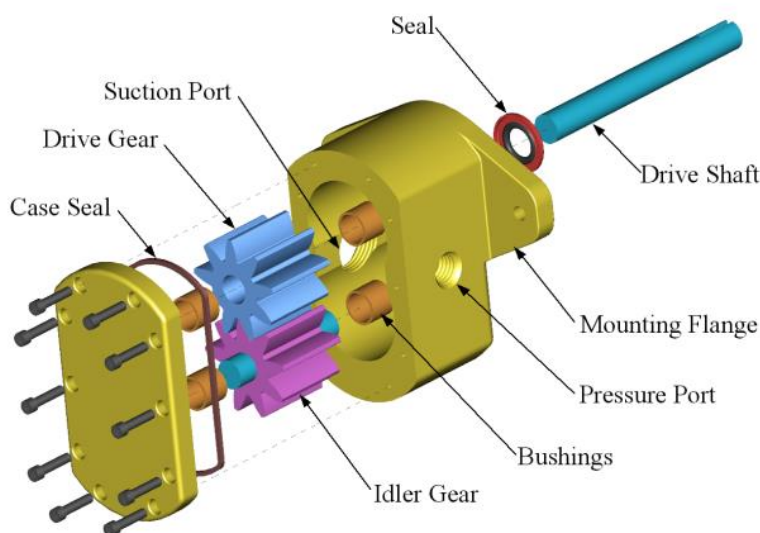
Diaphragm pumps also known as AOD pumps (Air operated diaphragms), pneumatic, and AODD pumps. The applications of these pumps mainly include in continuous applications like in general plants, industrial and mining



Diaphragm Pumps

2). Gear Pumps

These pumps are a kind of rotating positive displacement pump, which means they force a stable amount of liquid for every revolution. These pumps move liquid with machinery coming inside and outside of mesh for making a non-exciting pumping act. These pumps are capable of pumping on high forces & surpass at pumping high thickness fluids efficiently.



Gear Pumps

A gear pump doesn't contain any valves to cause losses like friction & also high impeller velocities. So this pump is compatible for handling thick liquids like fuel as well as grease oils. These pumps are not suitable for driving solids as well as harsh liquids.

3). Peristaltic Pumps

Peristaltic pumps are also named as tube pumps, peristaltic pumps. These are a kind of positive displacement pumps and the applications of these pumps mainly involve in processing of chemical, food, and water treatment industries. It makes a stable flow for

measuring & blending and also capable of pumping a variety of liquids like toothpaste and all kinds of chemicals.



Peristaltic Pump

PUMP

Is a mechanical device used to transfer liquids from one point to another by imparting energy supplied by a prime mover to the liquid. The prime mover can be electric motor, an IC engine or a steam engine or turbine. The power required depends on the quantity of the quantity of the liquid.

Types of pumps

Pumps are classified into two types namely Dynamic pumps as well as Positive Displacement Pumps.

Dynamic Pumps

Dynamic pumps are classified into different types but some of them are discussed below like Centrifugal, Vertical centrifugal, Horizontal centrifugal, Submersible, and Fire hydrant systems.

1). Centrifugal Pumps

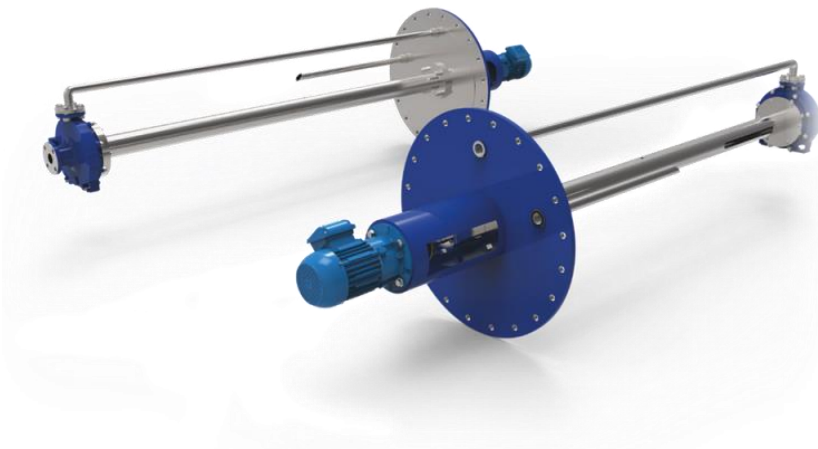
These types of pumps are most commonly used worldwide. The working is very simple, described well and carefully tested. This pump is strong, efficient and fairly cheap to make.



Centrifugal Pumps

2). Vertical Centrifugal Pumps

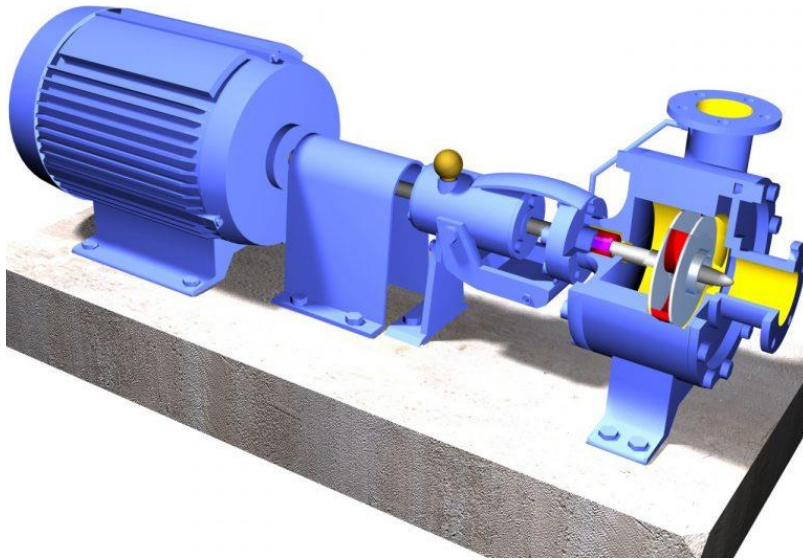
Vertical centrifugal pumps are also called as cantilever pumps. These pumps use an exclusive shaft & maintain design that permits the volume to fall within the pit as the bearings are external to the pit



Vertical Centrifugal Pumps

3). Horizontal Centrifugal Pumps

These types of pumps include a minimum of two otherwise more impellers. These pumps are utilized in pumping services. Every stage is fundamentally a divide pump.



Horizontal Centrifugal Pumps

All the phases are in a similar shelter & mounted on a similar shaft. On a solo horizontal shaft, minimum eight otherwise additional stages can be mounted. Every stage enhances the head by around an equal amount. Multi-stage pumps can also be single otherwise double suction on the first impeller. All kinds of pumps have been providing as well as servicing this type of centrifugal pumps.

4). Submersible Pumps

These pumps are also named as stormwater, sewage, and septic pumps. The applications of these pumps mainly include building services, domestic, industrial, commercial, rural, municipal, & rainwater recycle applications.



Submersible Pumps

These pumps are apt for shifting storm water, subsoil water, sewage, black water, grey water, rainwater, trade waste, chemicals, bore water, and foodstuffs. The applications of these pipes mainly include in different impellers like closed, contra-block, vortex, multi-stage, single channel, cutter, otherwise grinder pumps. For different applications, there is an extensive selection is accessible which includes high flow, low flow, low head, otherwise high head.

5). Fire Hydrant Systems

Fire hydrant pump systems are also named as hydrant boosters, fire pumps, & fire water pumps. These are high force water pumps intended to enhance the capacity of fire fighting of construction by increasing the force within the hydrant service as mains is not sufficient. The applications of this system mainly include irrigation as well as water transfer.



Fire Hydrant Systems

Positive Displacement Pumps

Positive displacement pumps are classified into different types but some of them are discussed below like diaphragm, gear, peristaltic, lobe, and piston pumps.

1). Diaphragm Pumps

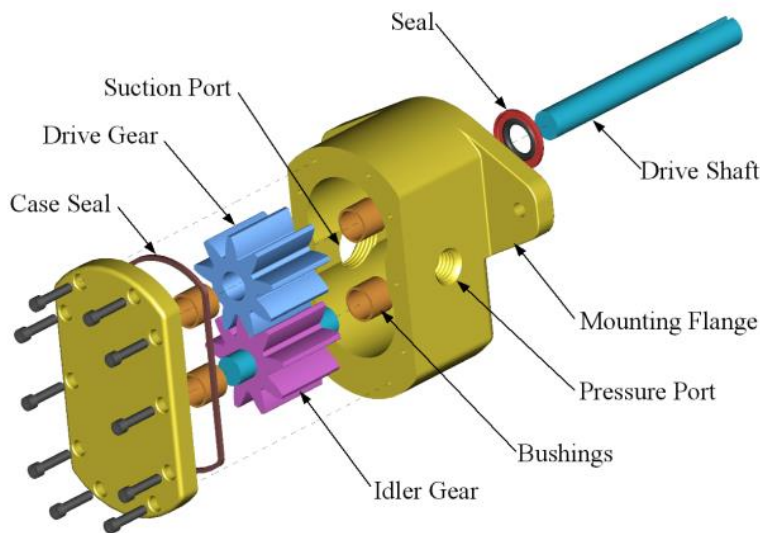
Diaphragm pumps also known as AOD pumps (Air operated diaphragms), pneumatic, and AODD pumps. The applications of these pumps mainly include in continuous applications like in general plants, industrial and mining



Diaphragm Pumps

2). Gear Pumps

These pumps are a kind of rotating positive displacement pump, which means they force a stable amount of liquid for every revolution. These pumps move liquid with machinery coming inside and outside of mesh for making a non-exciting pumping act. These pumps are capable of pumping on high forces & surpass at pumping high thickness fluids efficiently.



Gear Pumps

A gear pump doesn't contain any valves to cause losses like friction & also high impeller velocities. So this pump is compatible for handling thick liquids like fuel as well as grease oils. These pumps are not suitable for driving solids as well as harsh liquids.

3). Peristaltic Pumps

Peristaltic pumps are also named as tube pumps, peristaltic pumps. These are a kind of positive displacement pumps and the applications of these pumps mainly involve in processing of chemical, food, and water treatment industries. It makes a stable flow for measuring & blending and also capable of pumping a variety of liquids like toothpaste and all kinds of chemicals.



Peristaltic Pump