Gears

Gear systems and gear types

- Gear system uses toothed wheels that mesh together.
- Changes and input into and output.
- When chain of two or more gears mesh, called a gear train.
- Machines we use combine many gear trains in one machine.
- E.g. gears inside big telescope must change direction, speed, and force many times as lenses move to focus on object in space.

Types of gears

- Different jobs need different types of gears to get work done.
- Gears are made in different shapes and sizes different number of teeth.
- Differences enable gears to control speed, direction and turning force in machine.
- Most common gears used today are spur gears, bevel gears, rack and pinion gears, worm gears.

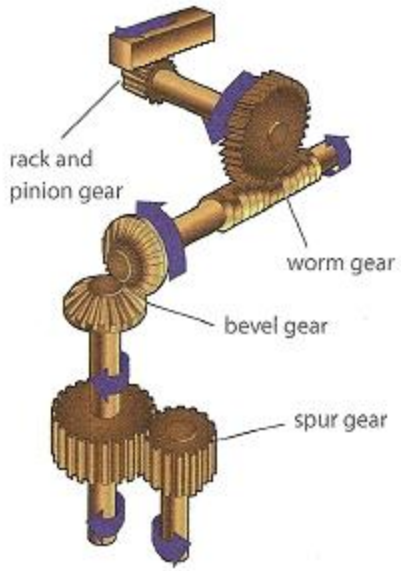

Figure 6 Different types of gears.

Spur gears

- Edge of every toot is straight and aligned parallel to turning axle.
- Two gears are intermeshed.
- Spur gears can regulate speed or force of motion.
- Most common type of gears used in machines, washing machines, eggbeaters and aircraft engines.

Figure 7 Spur gears.

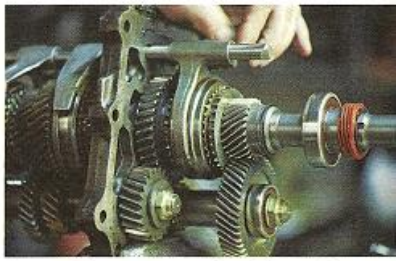

Figure 8 The reverse gear found in a car's manual transmission requires a spur gear.

Bevel gear

- Side of gear with teeth is shaped like a cone.
- Smaller gear usually drives gear system.
- Smaller gear is called pinion gear.
- Bevel gears are used to change direction of rotation.
- Used in watches, dentist's drills and electric typewriters.

Figure 9 Bevel gears.

Rack and pinion gear

- Gear system consists of two gears.
- Pinion is a normal spur gear that meshes with flat strip of gear teeth called rack.
- Type of gear changes rotary motion into linear motion.
- Either rack or pinion can be fixed allowing other part to move freely.
- Gears are used in car's steering mechanism, train wheels and milling machines.

Figure 10 A rack and pinion gear.

Worm gear

- Part of a shaft that has one continuous groove in form of screw thread.
- Shaft is called the worm shaft, meshes with a spur gear called the worm gear, or worm wheel.
- Types of gear can deliver a very strong turning force with very little input effort.

- Gears are used as turning heads of musical instruments such as guitars, winding mechanism of watches, corkscrews and toys.

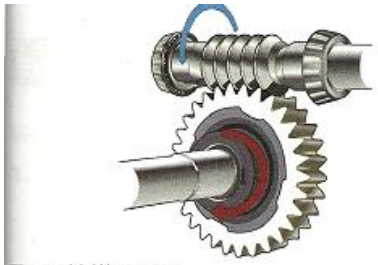

Figure 11 Worm gear.

Figure 12 A corkscrew uses a worm gear to operate.

Key words	
Gear system	Gears and gear wheels used to change the speed of turning movement
Gear train	Chain of gears used to transmit rotary motion from one shaft to another
Spur gear	Gear with teeth like spurs on its edge. This is the most common type of gear.
Bevel gear	Gear used to change rotational movement through 90^{o}
Rack and pinion gear	Gear that changes rotational movement into linear movement
Worm shaft	Part of a shaft that has one continuous groove in the form of a screw thread