

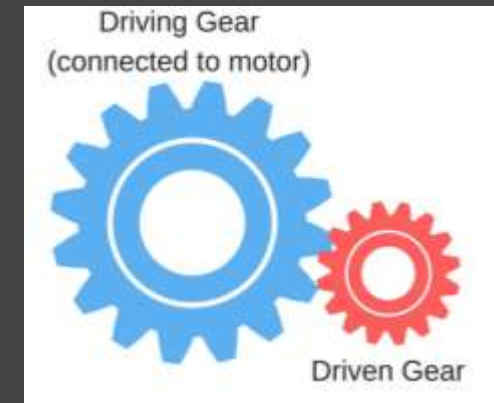
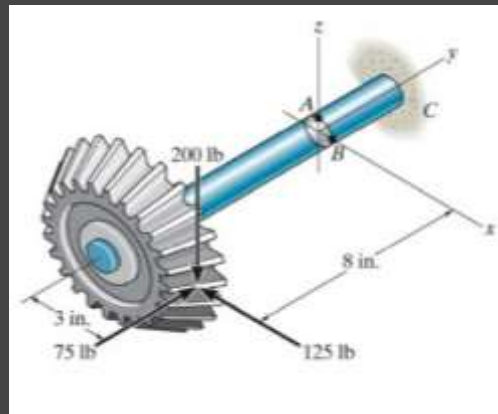
The background features a series of concentric circles in light gray, some solid and some dashed, creating a ripple effect. A large, solid red oval is centered on the page, containing the title and author information. A dark gray, curved shape is positioned to the left of the red oval, partially overlapping it.

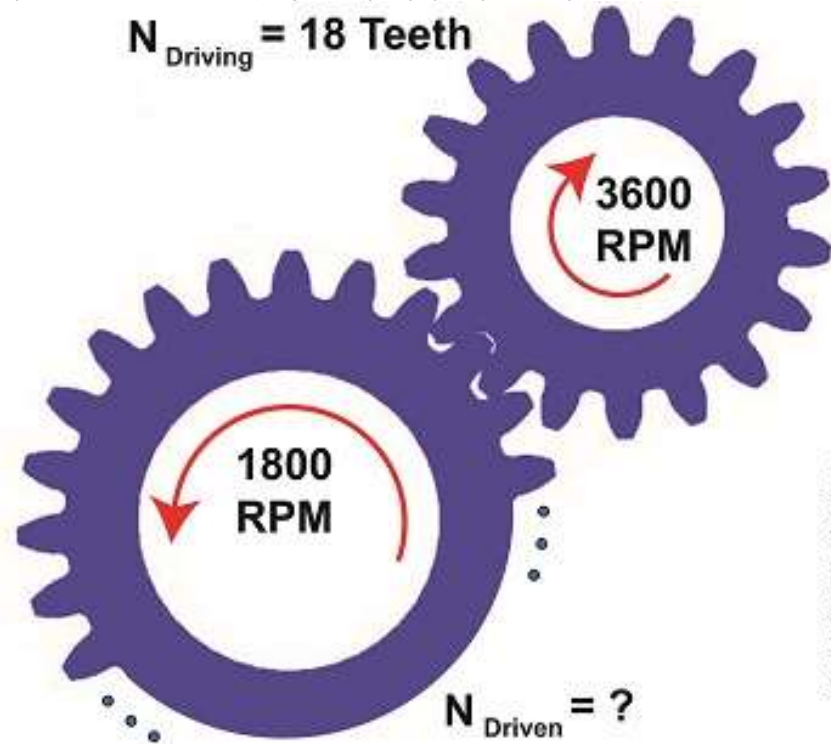
# BASICS OF MECHANICS

Shaik Shoiab ( 18-MEC-15 )

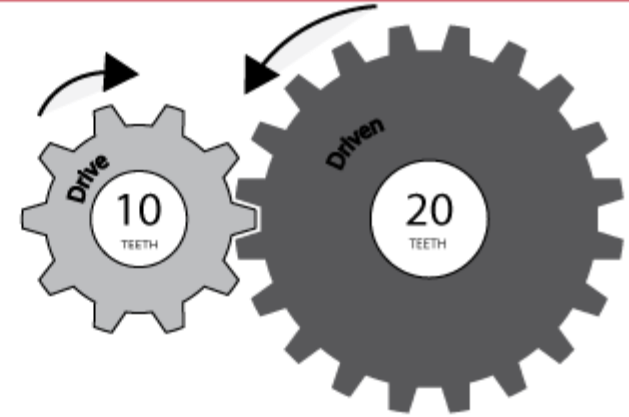
# GEARS

- Gears are **toothed, mechanical transmission elements** used to transfer motion and power between machine components.
- If the gears are not of equal sizes, the machine or system **experiences a mechanical advantage** which allows for a change in the **output speed and torque**.
- Each type of gears offers **different** behaviors and advantages.
- Gear Ratio – Also known as **Speed Ratio**. This is the ratio of the turning speed of the **input gear to that of the output gear**.

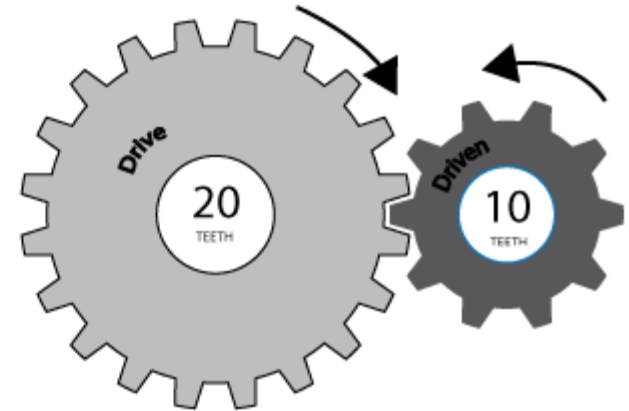




**Gear reduction** occurs when the drive gear is smaller or has fewer teeth than the driven gear.

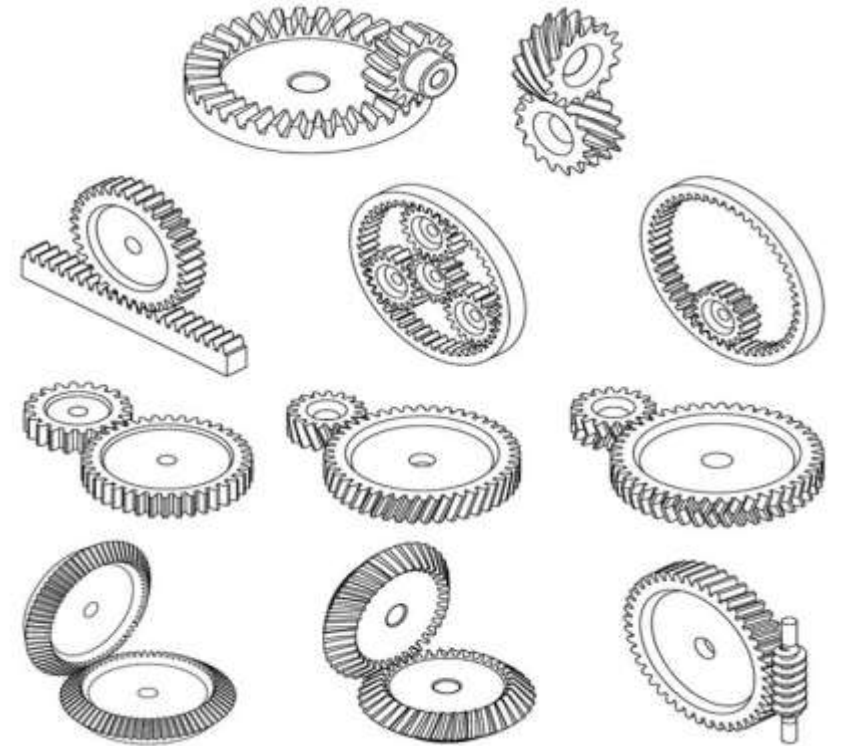


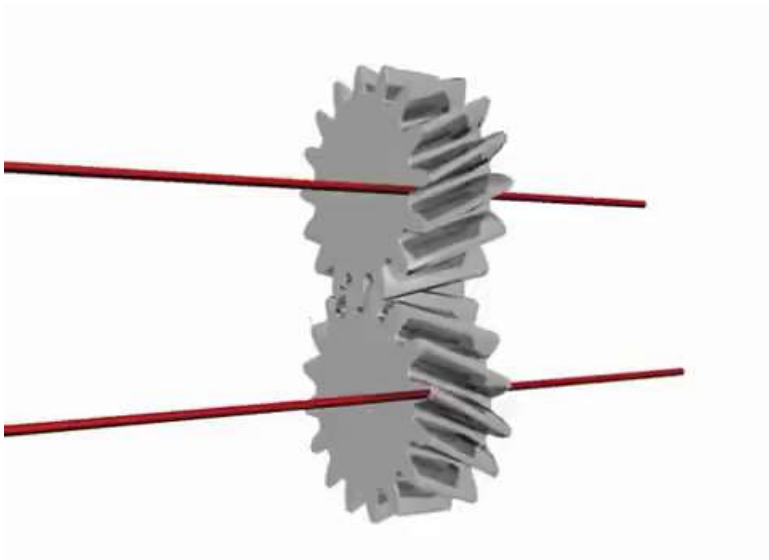
**Overdrive** occurs when the drive gear is larger or has more teeth than the driven gear.



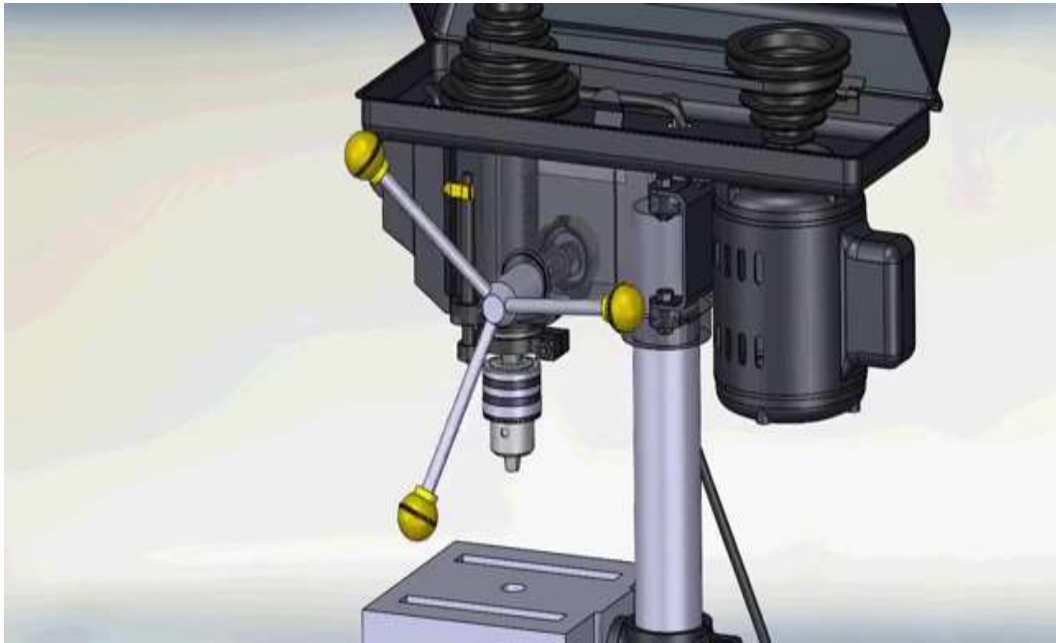
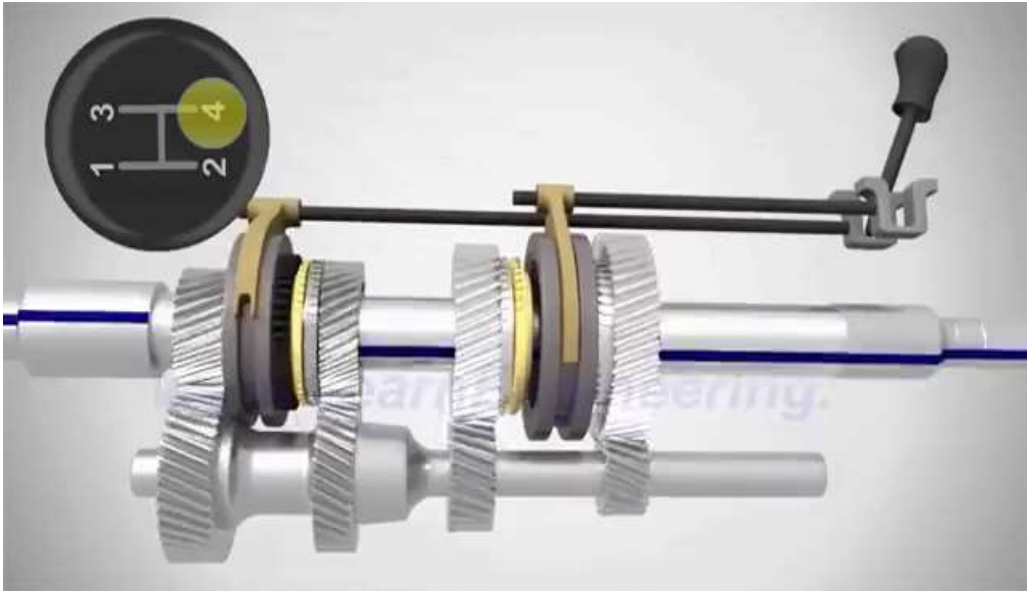
# TYPES OF GEARs

- Spur gears
- Helical gears
- Bevel gears
- Worm gears
- Rack and pinion









# BELT DRIVES

- Used to **transmit power** from one shaft to another by means of pulleys which rotate at the **same speed or at different speeds**.
- The amount of power transmitted depends upon the following factors: The **velocity of the belt** , The **tension under which the belt is** placed on the pulleys.





### **Flat belts**

shaft distance 5 to 10 meters, low power, high speed



### **Round belts**

smaller initial tension, absence of vibration and noise, high power, shaft distance > 5 meters



### **V belts**

shaft distance < 2 meters, high power, moderate speed



### **Timing Belts**

positive drives, precise, reliable



# EXAMPLES

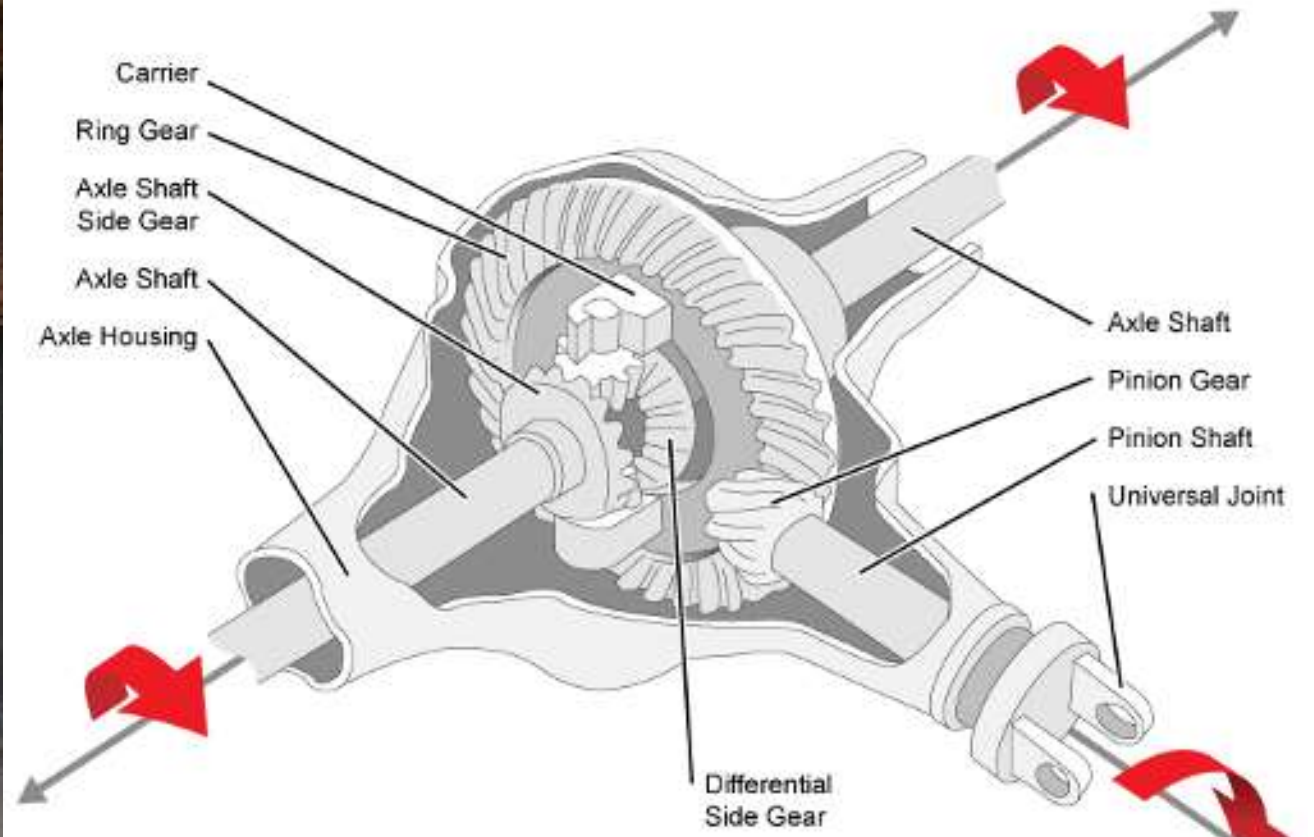






# DIFFERENTIAL

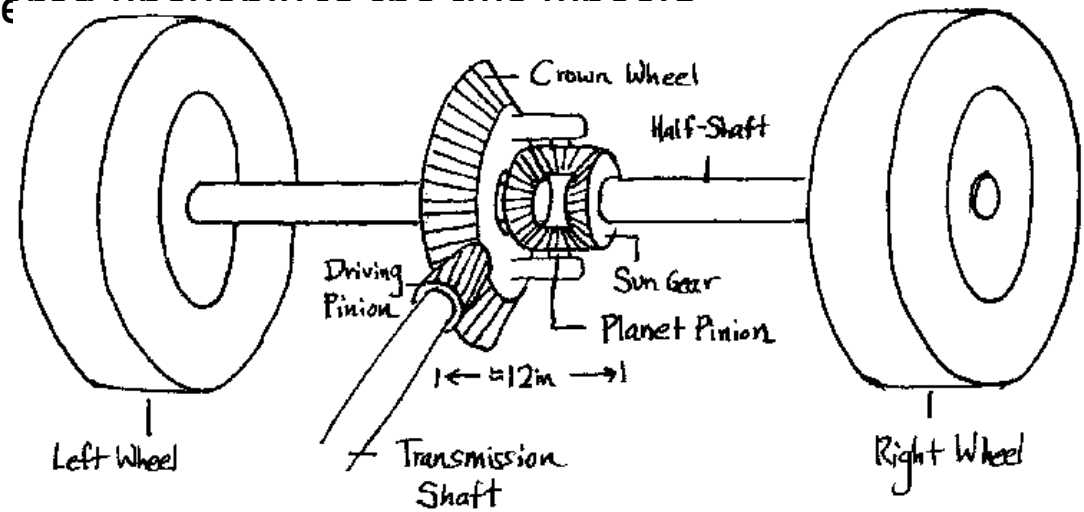
- The differential was first invented in China.
- System that transmits an engine's torque to the wheels.



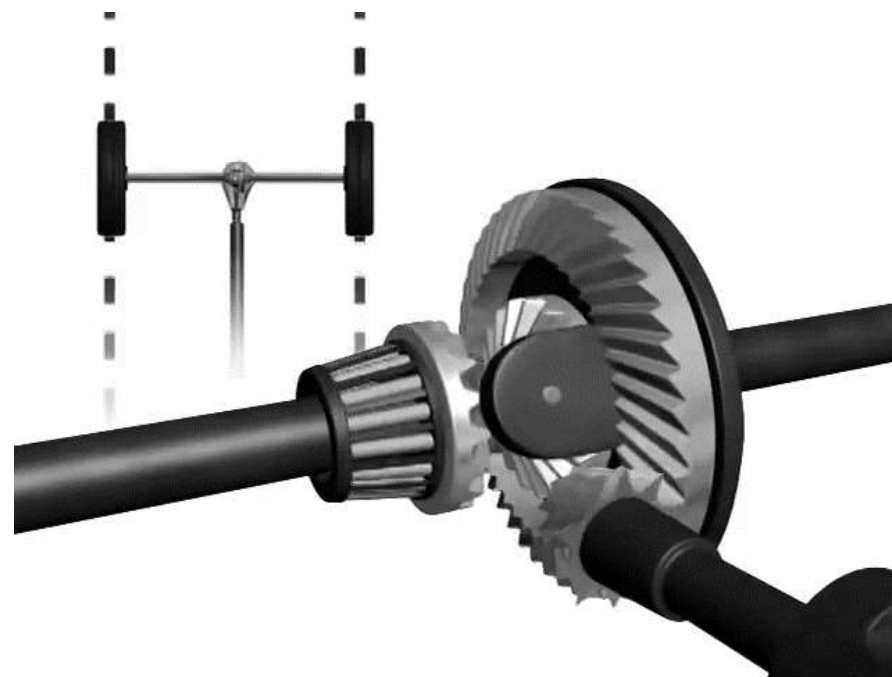


## HOW IT WORKS?

- When the car is traveling straight, both wheels travel at the same speed. Thus, the free-wheeling planet pinions do not spin at all. Instead, as the transmission shaft turns the crown wheel, the rotary motion is translated directly to the half-shafts, and both wheels spin with the angular velocity of the crown wheel (they have the same speed).
- When the car is turning, the wheels must move at different speeds. In this situation, the planet pinions spin with respect to the crown wheel as they turn around the sun gears. This allows the speed of the crown gear to be delivered unevenly to the two wheels.



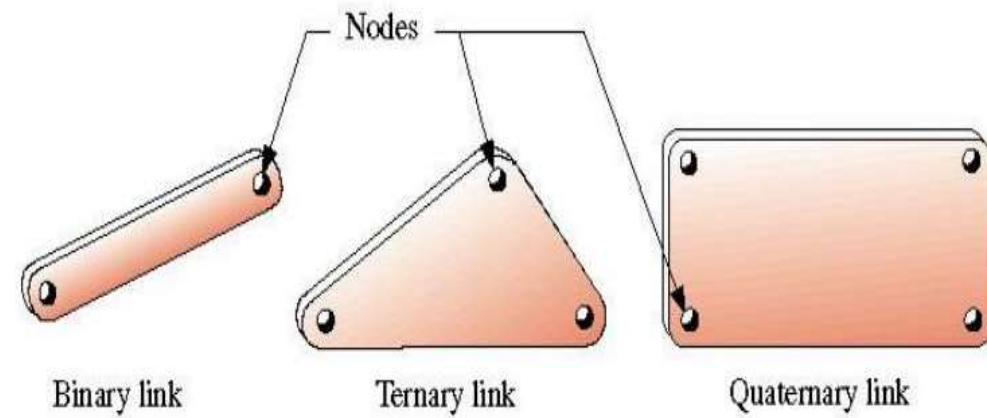





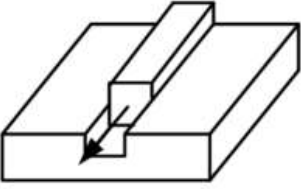
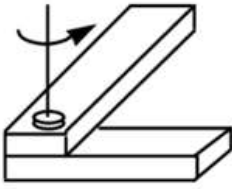



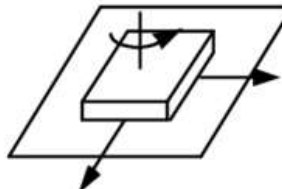
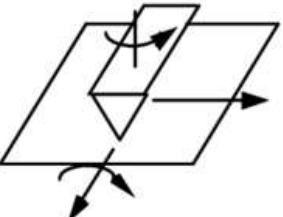
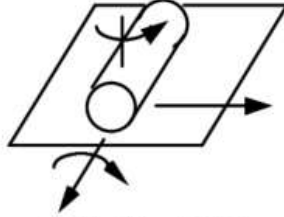
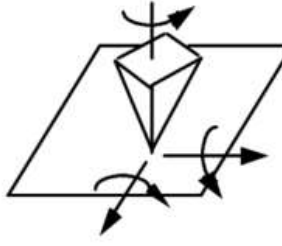
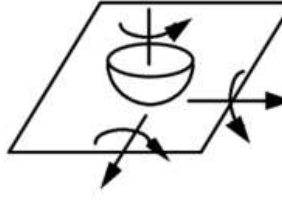
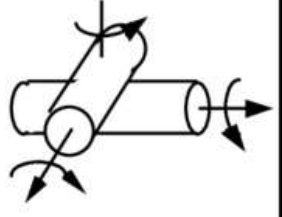
# LINKS & JOINTS

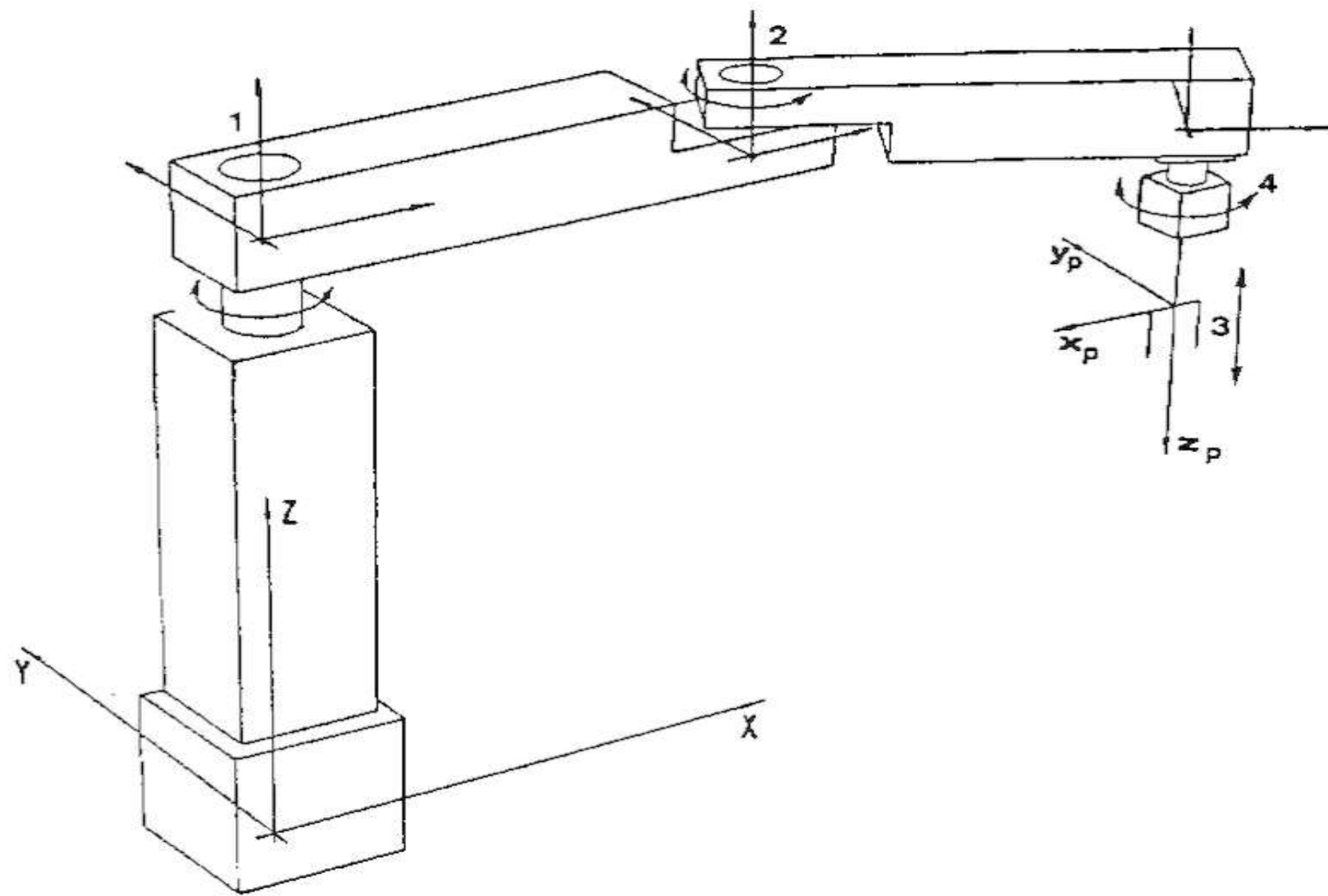
- Link or **Element** is part of a machine which has a **relative motion** wrt some other part.
- Joint or **Pair** is always a **connection between two links**.

# TYPES OF LINKS



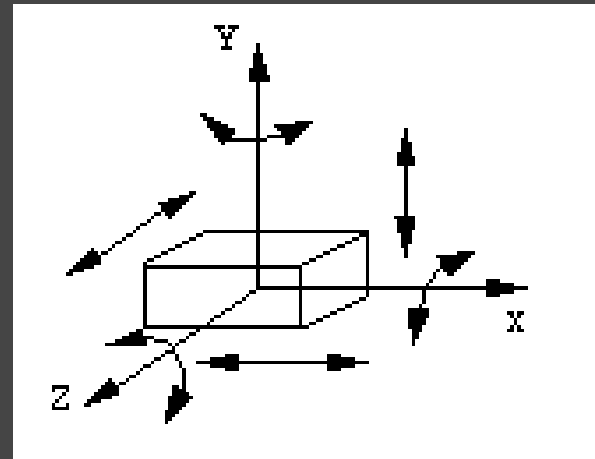
# TYPES OF JOINTS

 <p>Rigid (no motion)</p>	 <p>Prismatic</p>	 <p>Revolute</p>	 <p>Parallel Cylindrical</p>
 <p>Cylindrical</p>	 <p>Spherical</p>	 <p>Planar</p>	 <p>Edge Slider</p>
 <p>Cylindrical Slider</p>	 <p>Point Slider</p>	 <p>Spherical Slider</p>	 <p>Crossed Cylinder</p>



# DEGREES OF FREEDOM

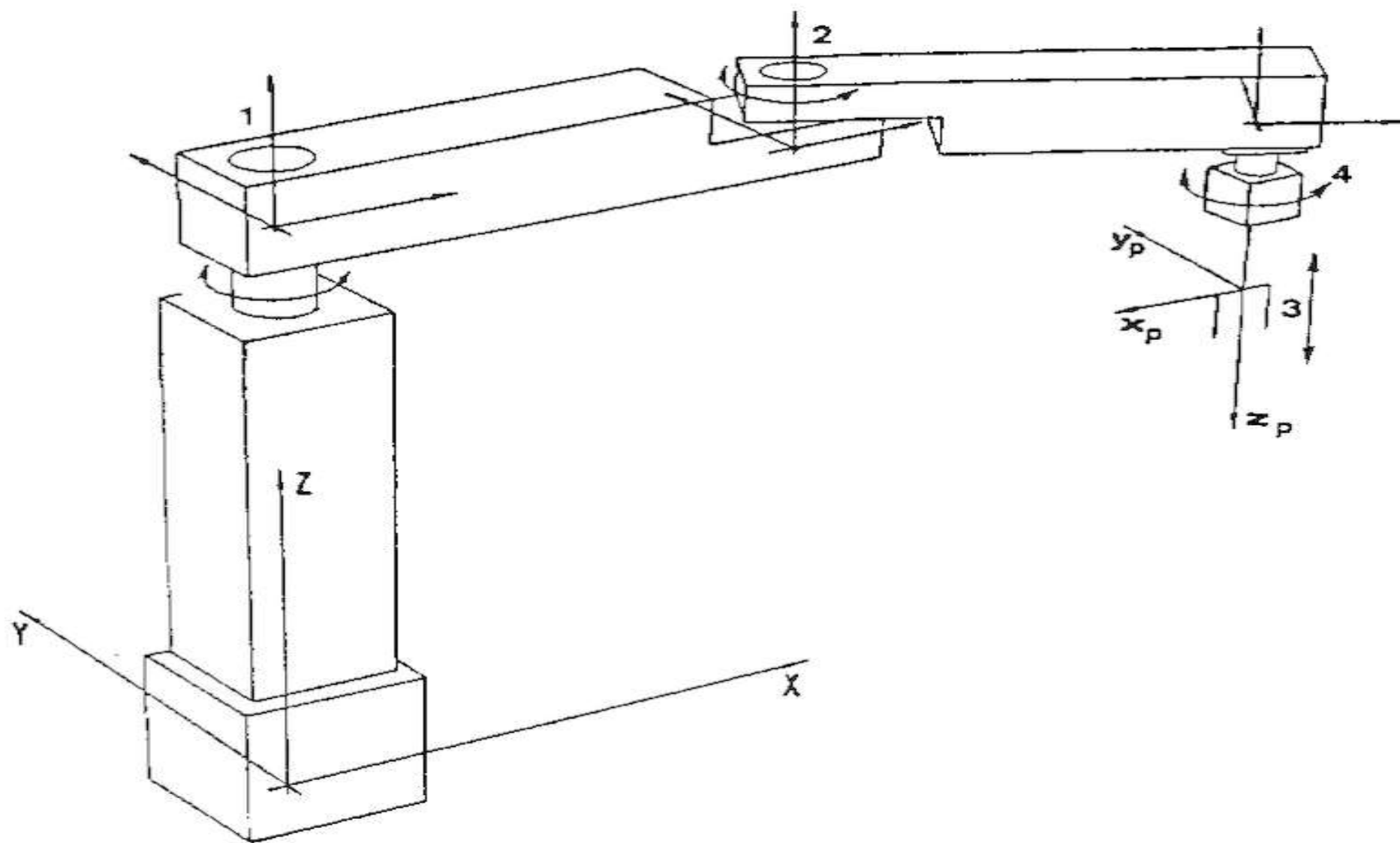
- Motion possibilities of rigid bodies.
- 6 Degrees of Freedom.







EXAMPLE



# MOTORS & ACTUATORS

- An actuator is a motor that converts energy into torque which then moves or controls a mechanism or a system.
- An electric motor is an electrical machine that converts electrical energy into mechanical energy.

# TYPES OF MOTORS



# TYPES OF ACTUATORS

- Hydraulic
- Pneumatic
- Electrical