

Rolling :

Rolling is a process which the metal is compressed between two rotating rolls for reducing its cross-sectional area. The crystals are elongated in the direction of rolling. This is one of the most widely used of all the metal working process because of its higher productivity and low cost, rolling would be able to produce components having constant cross-section through out length.

APPLICATION :

- This process is used in case of an industrial application such as I-Section, T-Section & D-Section.
- It is used to smother the surface of sheet metal.
- It is used in Automobile Section.

ADVANTAGES :-

- Produce uniform cross-section area.
- Less of wastage material.
- It is due to the Compressive force and Tensile force.
- Percentage of utilization is more.
- Low expensive process.

DISADVANTAGES :

- Operation process is difficult due to heavy weight of roller.
- More Power Consume.

VARIOUS ROLLING PROCESS

- 1) Two - High rolling process
- 2) Three - High rolling process
- 3) Four - High rolling process
- 4) Cluster rolling process
- 5) Planetary rolling process.

The arrangement of Rolls on a Rolling mill called rolling stand. They are various from depending on the application on the sheet metal or on other thin metal piece & no of rolls employed in the rolling stand.

- 1) **TWO - HIGH ROLLING PROCESS** - The high non-reversing rolling stand is the most common arrangement. In this the rolls always move in only one direction. But in high reversing rolling stand. The roll rotation can be reversed. This type of stand is particularly use full reducing the handling is not metal in between the rolling passes. These stands are more expensive is compared to the non-reversible type because of the reversible drive needed.
- 2) **THREE - HIGH ROLLING PROCESS** - A roll stand with 3 parallel rolls one above the other. Adjacent rolls rotate in opposite direction so that the material may be passed between the top and middle rolls in one direction and the bottom and middle rolls in the opposite one. This rolling sequence as without reversing the drives.
- 3) **FOUR - HIGH ROLLING PROCESS** - A roll stand with four parallel rolls one above the other is called as the Four- High Rolling Mills. The top and the bottom roll's rotate in opposite direction and two middle rolls also, the two middle roll's are called as the work roll and the upper two back roll's are called as the back up roll's. Four High Rolling mills is used to produce flat-plates, sheets and stoup material of uniform thickness.

- 4) **CLUSTER ROLLING MILLS** - It is special type of rolling mills in which two working rolls of smaller diameter & four or more back up rolls of larger diameter.
- 5) **PLANETARY ROLLING PROCESS** - It is a set of two or three stands of rolls set on parallel alignment so that a continuous pass may be made through each one successively with out change of direction of the material or pose in the rolling process.

Operation of Cupola Furnace:

PREPARATION OF CUPOLA:-

- Clean out the slag and repair the damaged lining with the mixture of fire clay and silica sand.
- After this bottom doors are raised and bottom sand is introduced.
- The surface of the sand bottom is sloped from all directions towards the tap hole, slag hole is also formed to remove the slag.

FIRING THE CUPOLA :

- A fire of wood is ignited on the sand bottom.
- After proper burning of wood, cook is added to level slightly above the tuyers.
- Air blast at a slower rate is turned on. After having red spots over the Fuel bed, extra coke is added to the predetermined height.

CHARGING THE CUPOLA :-

- After proper burning alternate layers of pig iron, cook and flux charged from the charging door until the cupola is full, steel scrap is also added to control the chemical composition, flux will be added to prevent the oxidation as well as to remove the impurities metal flux and coke are added in alternate layers until the cupola is full to the charging door.

SOAKING OF IRON :-

- After the furnace is charged fully the charge get's slowly heated up.
- Since the air blast is kept shut for about its minutes, this cases the iron to get soaked.

OPENING OF AIR BLAST :-

- At the end of the soaking period, the air blast is opened.
- Tap hole is closed to accumulate the sufficient amount of metal the rate of charging should be equal to the rate of melting so that the furnace remains full.

POURING THE MOLTEN IRON :-

- When sufficient metal collects in the well, the slag hole is opened and the slag is removed.
- After this tap hole is opened to collect the molten metal.

CLOSING THE CUPOLA :-

- At the end of the operation the charge feeding is stopped, air supply is cut off and the prop is removed.
- As soon as the prop is the door swing down providing a clear space for the cooke fire, residue of the molten metal with slag and the sand bed to fall down and, thus, the fire inside cases gradually.