

Sigma blade mixer & planetary mixer

MIXING: Theory and

Equipment

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Sigma blade mixer

Principle — shear. Inter meshing of sigma blades creates high shear and kneading action. Convective Mixing is achieved by cascading the material.

Construction and working:

- It consists of double trough shaped stationary bowl.
- Two sigma shaped blades are fitted horizontally in each trough of the bowl.
- These blades are connected to a fixed speed drive.
- Mixer is loaded from top and unloaded by tilting the entire bowl.
- The blades move at different speeds , one about twice than the other, which allows movement of powder from sides to centers.
- The material also moves top to downwards and gets sheared between the blades and the wall of the trough resulting cascading action.
- Perforated blades can be used to break lumps and aggregates which creates high shear forces.
- The final stage of mix represents an equilibrium state.



Sigma blade mixer

Uses of sigma blade mixer:

- Used in the wet granulation process in the manufacture of tablets, pill masses and ointments.
- It is primarily used for liquid-solid mixing, although it can be used for solid-solid mixing.

Advantages of sigma blade mixer:

- Sigma blade mixer creates a minimum dead space during mixing.
- It has close tolerances between the blades and the side-walls as well as bottom of the mixer shell.

Disadvantages of sigma blade mixer:

- Sigma blade mixer works at a fixed speed.

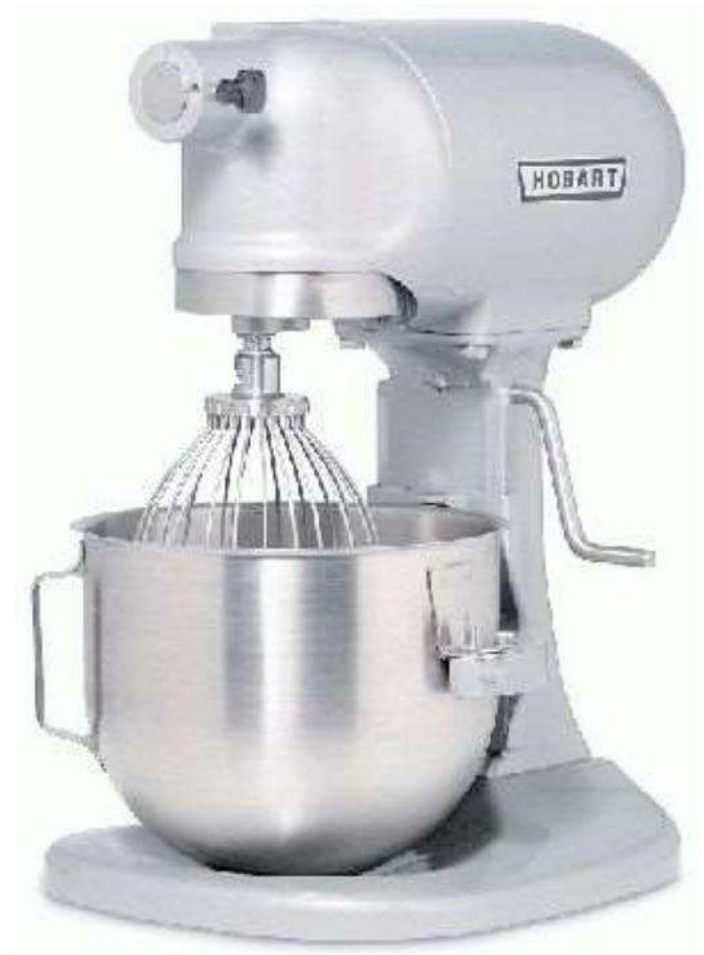
Planetary mixer

Principle:

Mechanism of mixing is shear. Shear is applied between moving blade and stationary wall. Mixing arm moves around its own axis and around the central axis so that it reaches every spot of the vessel. The plates in the blades are sloped so that powder makes an upward movement to achieve tumbling(convective) action also.

Construction:

- Consists of vertical cylinder shell which can be removed.
- The blade is mounted from the top of the bowl.
- Mixing shaft is driven by planetary gear and it is normally built with variable speed drive.



Working

- In the planetary mixer, the agitator has a planetary motion.
- It rotates on its own axis so that it reaches all parts of the vessel.
- Beater is shaped to pass with close clearance over the side and bottom of the mixing bowl.
- Therefore, literally there are no dead spaces in the mixing bowl.
- The blade tears the mass apart and shear is applied between the moving blade and the stationary wall.
- The plates in the blade are sloped so that the powder makes an upward movement.
- Therefore, tumbling (convective) motion is also obtained.

Uses

- Break down agglomerates rapidly.
- Low speeds are used for dry blending and fast for wet granulation.

Advantages:

- Speed of rotation can be varied at will.
- More useful for wet granulation process.

Disadvantages:

- Mechanical heat is buildup within the powder mix.
- It requires high power.
- It has limited size and is useful for batch work only.

Applications of solid mixing

- Involved in the preparation of many types of formulations.
- It is also an intermediate stage in the production of several dosage forms.
 - Wet mixing in the granulation step in the production of tablets and capsules.
 - Dry mixing of several ingredients ready for direct compression as in tablets.
 - Dry blending of powders in capsules, dry syrups and compound powders.
 - Production of pellets for capsules.



Thank You