

BASIC KNOWLEDGE

COMMINATION

Comminution alters the particle size and shape and the surfaces of solids. Virtually all solids must be comminuted when being mined or processed.

The comminution of solids can be used for a variety of purposes:

■ **Creating intermediate or end products with specific particle sizes**

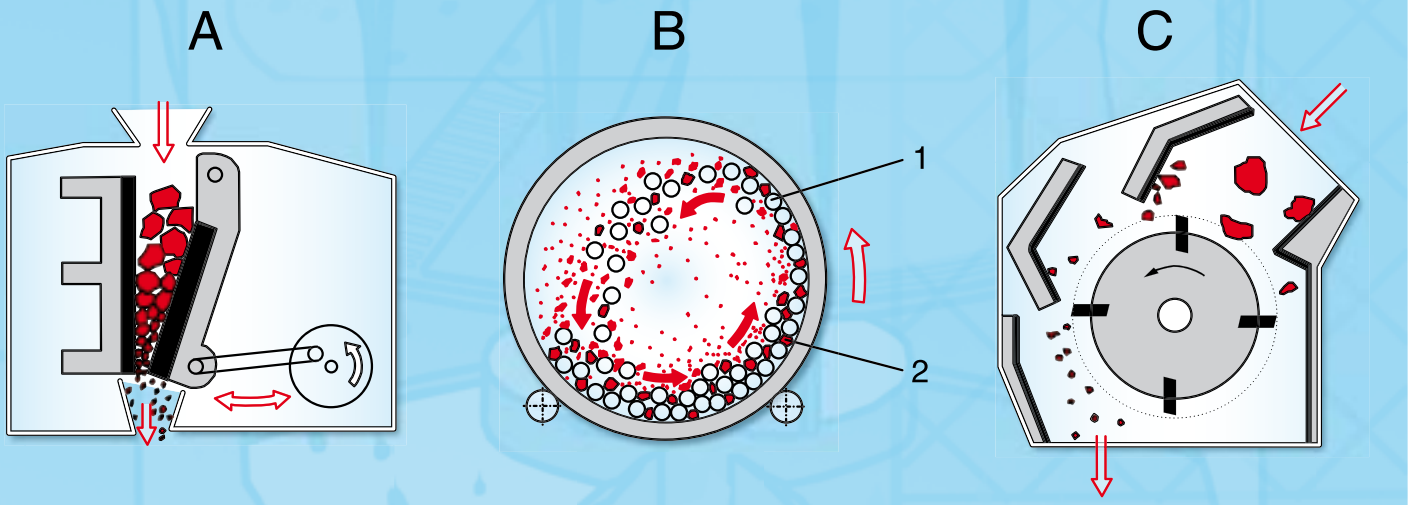
For many processes applied to solids, specific particle sizes are required in order to create a desired product. For example, thermoplastic input products must be delivered in the form of pellets of a specific size. That is the form in which they can best be melted and formed.

■ **Enlargement of the surface**

Chemical reactions take place more rapidly when the surface areas of the reacting materials are larger. For example, fine milled coal dust burns explosively, while large pieces of coal burn slowly. Likewise, salts are dissolved more quickly in liquids the smaller their particle size.

■ **Recovery of usable materials from solid compounds**

Waste materials, mineral and plant raw materials consist of different components. In order to expose the usable materials for further processing, the raw materials must be comminuted. The comminution process is often followed by a sorting process to separate out the usable material. A key example is the recovery of iron ores from rock compounds.



Examples of comminution machines:

A jaw crusher, B ball mill, C impact crusher, 1 milling balls, 2 material to be milled

The result of a comminution depends primarily on the method of stress loading applied. In most comminution machines stress is applied between two solid surfaces or by impact:

■ **Stress between solid surfaces**

The particles are between two surfaces which are moving relative to each other. In the process, the particles are subjected to stress, such as by pressure, shearing, shock impact or cutting. This type of stress loading occurs in the case of jaw crushers and roller or ball mills for example.

■ **Impact stress**

The particles either impact at high speed against a fixed wall or a tool moves against a free-flying particle. The comminution can also occur when two particles collide.

Typical comminution machines in which the particles are subjected to impact stress are impact crushers and hammer crushers.