

**Fig of a Pug mill**

***Moulding:***

The clay which is prepared as above is then sent for the text operation of moulding. Following are two types of moulding:

- i. Hand Moulding
- ii. Machine Moulding

**Hand moulding:**

In hand moulding , the bricks are moulded by hand *i.e.*; manually. It is adopted where manpower is cheap and is readily available for the manufacturing process of bricks on a small scale. The moulds are rectangular boxes which are open at top and bottom. They may be of wood or steel. It should be prepared from well-seasoned wood. The longer sides are kept slightly projecting to serve as handles. The strips of brass or steel are sometimes fixed on the edges of wooden moulds to make them more durable. It is prepared from the combination of steel plate and channel. It may even be prepared from steel angles and plates. The thickness of steel mould is 6mm. They are used for manufacturing bricks on a large scale. The steel moulds are more durable than wooden one and turn out bricks of uniform size. The bricks shrink during drying and burning . Hence the moulds are therefore made larger than burnt bricks (8-12%).

The bricks prepared by hand moulding are of two types: Ground moulded and Table moulded

Ground moulded bricks: The ground is first made level and fine sand is sprinkled over it. The mould is dipped in water and placed over the ground. The lump of tempered clay is taken and is dashed in the mould. The clay is pressed in the mould in such a way that it fills all the corners of mould. The surplus clay is removed by wooden strike or framed with wire. A strike is a piece of wood or metal with a sharp edge. It is to be dipped in water every time. The mould is then lifted up and raw bricks are left on the ground. The mould is dipped in water and it is placed just near the previous brick to prepare another brick. The process is repeated till the ground is covered with raw bricks. The lower faces of ground moulded bricks are rough

and it is not possible to place frog on such bricks. A frog is a mark of depth about 10mm to 20mm which is placed on raw brick during moulding. It serves two purposes.

1. It indicates the trade name of the manufacturer

2. In brick work, the bricks are laid with frog uppermost. It thus affords a key for mortar when the next brick is placed over it.

The ground moulded bricks of better quality and with frogs on their surface are made by using a pair of pallet boards and a wooden block. A pallet is a piece of thin wood. The block is bigger than the mould and it has a projection of about 6mm height on its surface. The dimensions of the projection correspond to the internal dimensions of the mould. The design of the impression or frog is made on this block. The wooden block is also known as the moulding block or stock board.

The mould is placed to fit in the projection of the wooden block and clay is then dashed inside the mould. A pallet is placed on top and the whole thing is then turned upside down. The mould is taken out and placed over the raw brick and it is conveyed to the drying sheds. The bricks are placed to stand on their longer sides in drying sheds and pallet boards are brought back for using them again. As the bricks are laid on edge, they occupy less space and they dry quicker and better.

#### Table Moulded Bricks:

- i) The process of moulding of bricks is just similar as above. But in this case, the mould stands near a table size 2m x 1m. The bricks are moulded on the table and sent for further process of drying.
- ii) However, the efficiency of the moulder gradually decreases because of standing at some place for a longer duration. The cost of brick is also increased when table moulding is adopted.

#### Machine Moulding:

This type of moulding is carried out by two processes:

- i) Plastic clay machine
- ii) Dry clay machine

#### Plastic Clay Moulding

i) Such a machine consists of a rectangular opening having length and width equal to an ordinary brick. The pugged clay is placed in the machine and it comes out through the rectangular opening.

ii) These are cut into strips by the wire fixed at the frame. The arrangement is made in such a way that the strip thickness is equal to that of the bricks obtained. So it is also called as WIRE CUT BRICKS.

### Dry Clay Machinemoulding:

In these machines, the strong clay is finally converted in to powered form. A small quantity of water is then added to form a stiff plastic paste.

ii) Such paste is placed in mould and pressed by machine to form dry and well-shaped bricks. They do not require the process of drying.

### **Drying**

The damp bricks, if brunt, are likely to be cracked and distorted. Hence the moulded bricks are dried before they are taken for the next operation of burning. For the drying the bricks are laid longitudinally in the stacks of width equal to two bricks. A stack consists of ten or eight tiers. The bricks are laid along and across the stock in alternate layers. All the bricks are placed on edges. The bricks are allowed to dry until the bricks are become leather hard of moisture content about 2%.

### **Burning**

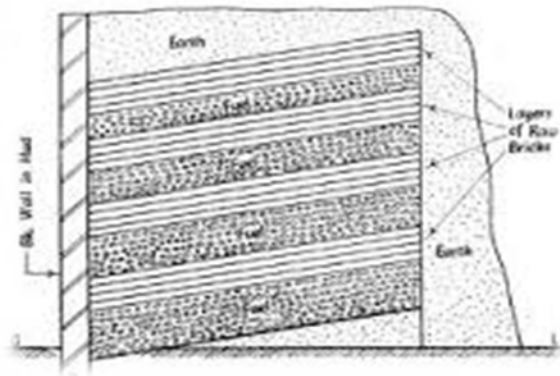
Bricks are burned at high temperature to gain the strength, durability, density and red color appearance. All the water is removed at the temperature of 650 degrees but they are burnt at an temperature of about 1100 degrees because the fusing of sand and lime takes place at this temperature and chemical bonding takes between these materials after the temperature is cooled down resulting in the hard and dense mass.

Bricks are not burnt above this temperature because it will result in the melting of the bricks and will result in a distorted shape and a very hard mass when cooled which will not be workable while brickwork. Bricks can be burnt using the following methods:

- (a) Clamp Burning
- (b) Kiln Burning

### **Clamp Burning:**

Clamp is a temporary structure generally constructed over the ground with a height of about 4 to 6 m. It is employed when the demand of the bricks is lower scale and when it is not a monsoon season. This is generally trapezoidal in plan whose shorter edge among the parallel sides is below the ground and then the surface raising constantly at about 15 degrees to reach the other parallel edge over the ground. A vertical brick and mud wall is constructed at the lower edge to support the stack of the brick. First layer of fuel is laid as the bottom most layer with the coal, wood and other locally available material like cow dung and husk. Another layer of about 4 to 5 rows of bricks is laid and then again a fuel layer is laid over it. The thickness of the fuel layer goes on with the height of the clamp.



After these alternate layers of the bricks and fuel the top surface is covered with the mud so as to preserve the heat. Fire is ignited at the bottom, once fire is started it is kept under fire by itself for one or two months and same time period is needed for the cooling of the bricks.

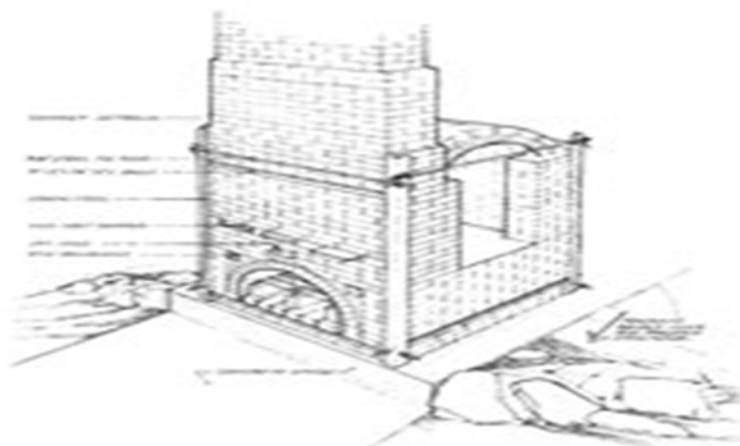
Disadvantages of Clamp burning:

1. Bricks at the bottom are over-burnt while at the top are under-burnt.
2. Bricks loose their shape, and reason may be their descending downward once the fuel layer is burnt.
3. This method cannot employ for the manufacturing of large number of bricks and it is costly in terms of fuel because large amount of heat is wasted.
4. It cannot be employed in monsoon season.

**Kiln Burning:**

Kiln is a large oven used for the burning of bricks. Generally coal and other locally available materials like wood, cow dung etc can be used as fuel. They are of two types:

- Intermittent Kilns.
- Continuous Kilns.



**Fig of a typical kiln**