Fly Ash Brick Technology

Fly ash refers to the ash produced during combustion of coal. It is the fine powder formed from the mineral matter in coal, consisting of the non-combustible matter in coal plus a small amount of carbon that remains from incomplete combustion. Fly ash is being accumulated as waste material in large quantities near thermal power plants. As the power requirements of the country goes up, the amount of waste produced will also increase enormously creating problems for its safe disposal due to lack of adequate disposal facilities. Its use in manufacture of bricks will be helpful in its disposal and also help in controlling pollution. It is supplied free of cost to entrepreneurs.

Fly Ash bricks are made of fly ash, lime, gypsum and sand. The raw materials are blended in desired proportions in a Pan mixer for 4-5 minutes and compressed. They undergo curing for a minimum of 14 days and are then air dried for 7 days. Strength of these bricks can be engineered by varying the compositions. These can be extensively used in all building constructional activities similar to that of common burnt clay bricks. The fly ash bricks are comparatively lighter in weight and stronger than common clay.

Benefits:

- High compressive strength.
- Low water absorption.
- Dimensional accuracy through uniform shape.
- High strength to weight ratio.
- No emission of green house gases during production.
- Zero efflorescence.
- Consume less mortar in construction.
M/S Jai Balajee Enterprises, Rourkela, Odisha

Summary

Mr. Bula Prasad started his business using fly ash in 2010. There is abundance of industrial waste in Rourkela due to the presence of 30 sponge iron industries, so he has started making fly ash bricks.

Raw Materials

- **Fly ash**: This unit used fly ash from Rourkela Steel Plant at Rs. 400 per ton.
- **Sand**: It was obtained from Koyal River at the rate of Rs. 200 per tractor.
- **Lime**: It was sourced at Rs. 800 per ton from a place which is 10 km away from this unit.
- **Gypsum**: It was obtained from Paradeep at the rate of Rs. 1500 per ton.

Equipment Details

This unit has mechanized pan mixers and hydraulic brick making machines for the production of fly ash blocks. The hydraulic machine makes 6000 bricks in a day. This unit has two brick making machine but only one is in working condition. This unit produced 6000 bricks per day.

Production Process

Lime and gypsum are put in the mixer, before the addition of water. This is followed by sand and then fly ash. The raw materials are mixed in the pan mixer for 10 minutes. From the pressing machine, the final bricks are taken and stacked for curing and drying. After the second day, water is sprinkled over the bricks and is cured for 15 days. After 15 – 20 days of production, the fly ash bricks are sold in the market at a price of Rs. 3 rupees per brick. Mostly the bricks are used in building construction. 15 labourers were used for the entire process.
**Summary**

Mr. Sushanto Badhai started his business with the fixed chimney kiln in 2008. He took the decision of switching to fly ash bricks in 2010 after he started facing problems, especially labour issues.

**Raw Materials**

- **Fly ash**: It was obtained from MSP Steel and Power Ltd. free of cost.
- **Sand**: It was sourced from Ib river at Rs. 250 per tractor (100 cft).
- **Lime**: It was obtained at the rate of Rs.2200 per ton from a source 10 km away from the plant.
- **Gypsum**: It was obtained from nearby areas at the rate of Rs.1400 per ton

**Equipment Details**

This unit has mechanized pan mixers and mechanized pressing machines for brick production. A tray is fitted in between pan mixer and pressing machine to transfer the mixed materials into the mould of the pressing machine. Pressing machine has three set of moulds having the capacity to produce two bricks in one revolution.

**Production Process**

Firstly lime and gypsum are added to the mixer along with required amounts of water. After that sand is added and finally fly ash is mixed in the pan mixer for 10 minutes. From the pressing machine, the final bricks are taken and stacked for curing and drying. The next day water is sprinkled over the bricks. They are then dried for 15 days. After 15 – 20 days of production, the fly ash bricks are sold in the market at a price of Rs. 2.50 rupees per brick. Mostly the bricks are used for construction of building. This unit produces 4000 bricks per day.
M/S Mahila Ash Industry, Chandrapur, Maharashtra

**Summary**

MAI Started in April 2006 at Yanbodi village with an aim to generate the livelihood opportunities by involving the women Self Help Group members in fly ash brick production activity and to create a good environment by utilizing the fly ash in an economical way. Seven SHG women members are presently engaged in the fly ash brick production activity. This unit was financially supported by Chandrapur Co-Operative Bank Ltd, Chandrapur. The chair person cum owner of the above bank Mr. Baba Saheb Basade provided the land and building to set up the unit.

![Image of the plant](image1.png)

**Raw Materials**

- **Fly ash:** It was obtained from Chandrapur thermal station at the rate of Rs 300 per ton.
- **Sand:** It was sourced from nearby areas at the rate of Rs. 100 per ton.
- **Lime:** It was obtained at the rate of Rs.1500 per ton from Wani, Chandrapur district.
- **Gypsum:** It was obtained from Gujarat at the rate of Rs.1500 per ton

**Equipment Details**

This unit has mechanized pan mixers and hydraulic pressing machines. Pan mixer has the capacity of mixing 100 kg mix at a time.

**Production Process**

The raw materials are mixed for 10 minutes and then the mixture is transferred to the hydraulic pressing machine for compaction. After that the fly ash blocks are loaded through trolley and stacked carefully for drying and curing. In this plant watering is done continuously for 15 days. After 15 – 20 days of production, the fly ash bricks are sold in the market at a price of Rs. 1.90 rupees per brick. Mostly the bricks are used for construction of building. This unit produces 4000 bricks per day.
M/S Raj Industry, Nagpur, Maharashtra

Summary

Raj industry was established in the year 2006. It is situated in the place Waregaon in the district of Nagpur, Maharashtra. Mr. Ashish Singh is the owner of this plant. The plant comprises an area of 5 acre having the production capacity of 14000 bricks per day.

Raw Materials

- **Fly ash**: It was obtained from Khaparpeda thermal station. This unit required 21 tonnes of fly ash per day.
- **Sand**: It was sourced from nearby area.
- **Lime**: It was obtained from Katni, Madhya Pradesh.
- **Gypsum**: It was obtained from Gujarat. This unit required 16 tonnes per month.

Equipment Details

Raj Industry has mechanized pan mixer, inclined belt for conveying the mixture of raw materials and mechanized pressing machine. Presently only two equipments are in working condition. 12 numbers of labourers are required per set for the entire process of production.

Production Process

The raw materials are mixed in the mechanized pan mixer. One inclined belt is fitted in between pan mixer and pressing machine to convey the mixture of raw materials to the pressing machine. The pressing machine has three sets of brick mould. One set of mould receive the mixture, then it is compressed and finally two bricks are made in one revolution of this machine. The unit is producing 1000 bricks per hour.

After compression of the bricks, these are carried out through the trolley and stacked carefully for drying and curing. Water is given after 5 days of manufacturing twice in two weeks. After one month Raj Industry sells these ash blocks in the market in a profitable way. The bricks are used in construction of buildings, walls etc.
**Summary**

Rajesh Brick Industry was set up in the year 2007 in Waregaon in Nagpur district, Maharashtra. Mr. Rajesh Lakhotia is the owner of this plant. The unit is set up in an area 2.5 acres having the production capacity of 12000 bricks per day.

**Plant:** M/S Rajesh Brick Industry, Waregaon, Nagpur, Maharashtra  
**Year of Establishment:** 2007  
**Production Capacity:** 12000 bricks/day  
**Brick Size:** 9”×4”×3”  
**Brick weight:** 3.5 kg  
**Brick Price:** Rs. 2.20/ brick  
**Man Power:** 12  
**Owner:** Mr. Rajesh Lakhotia

**Raw Materials**

- **Fly ash:** It was obtained from Khaparpeda thermal station at the rate of Rs 1500 per 8 tonnes.  
- **Sand:** It was sourced from nearby area at the rate of Rs 2500 per ton.  
- **Lime:** It was obtained from Katni, Madhya Pradesh at the rate of Rs. 550 per ton.  
- **Gypsum:** It was obtained from Gujarat. This unit required 20-22 tonnes per month.

**Equipment Details**

The plant has mechanized pan mixer, inclined belt for delivering the mix raw materials, mechanized pressing machine, hydraulic trolley for loading and unloading materials. The pan mixer has the capacity of mixing 250 kg of raw materials.

**Production Process**

The raw materials are mixed in the pan mixer along with required amount of water. The mixed raw material is conveyed through the inclined belt and is transferred in to the hopper of the mechanized pressing machine for compaction. After compression from the pressing machine, the bricks are carried out through the trolley and stacked carefully for drying and curing. Water is given after 3 days of manufacturing for thrice in three week. After one month Raj Industry sells these ash blocks in the market at a reasonable price. They make a profit of 80 paisa by selling it. The bricks are used in the construction of buildings, walls etc.
Summary

Panchtarka Ash Brick Industry (PABI) was established on 7th March 2008. It is situated in Khaparkheda in the district of Nagpur, Maharashtra. The plant was setup by an NGO Van Sampada which helps in providing employment to many women. The technical support and required machineries to run this plant was given by Technology and Action for Rural Advancement (TARA). The bank loan was procured from Dena Bank. From bringing raw materials to selling the final blocks, entire work process is managed by these women members.

Raw Materials

- Fly ash: It was obtained from Khaparpeda thermal station free of cost. This unit spent Rs. 850 per trip for transportation.
- Sand: It was sourced from nearby river at the rate of Rs. 500-600 per trip.
- Lime: It was obtained from Katni, Madhya Pradesh at the rate of Rs. 550 per ton.
- Gypsum: It was obtained from Gujarat. This unit required 20-22 tonnes per month.

Equipment Details

This unit is using mechanized pa mixers and TARA BALRAM mechanized pressing machines for making as bricks. The cost of pan mixer is Rs. 2.21 lakhs having 300 kg mixing capacity. With 200-240 kg of mixture, 75-80 numbers of bricks are produced. The hydraulic pressing machine costed Rs. 2.96 lakh and has the capacity of making 500 bricks per hour.

Production Process

The raw materials are mixed in the mechanized pan mixer for 10 minutes and transferred to the hopper of the TARA BALRAM mechanized pressing machine for compaction. The compressed blocks are then carried forward for curing and drying. The blocks are ready for selling in market after 21-22 days of manufacturing. The unit has the production capacity of 700 bricks per day. Entire operation and maintenance of the plant is done by the women member of SHGs.
Summary

Mr. S. Rizaman Patel is the owner of the plant Adarsh Tile and Pipe Industry. He started this unit in the year 1997. This fly ash unit is situated at Maharashtra Industry Development Corporation (MIDC) in the district Chandrapur. The unit has the capacity of producing 9000 ash bricks per day.

Raw Materials

- **Fly ash**: It was obtained from Chandrapur at the rate of Rs. 200 per ton.
- **Sand**: It was obtained free of cost.
- **Lime**: It was obtained from Wani at the rate of Rs. 400 per ton.
- **Gypsum**: It was sourced from Mumbai at the rate of Rs. 1500 per ton.

Equipment Details

This unit has mechanized pan mixers and mechanized pressing machines. One tray is fitted in between pan mixer and pressing machine to transfer the mix materials in the mould of the pressing machine. Pressing machine has three set of moulds having capacity to produce two bricks in one revolution.

Production Process

Lime and gypsum are put in the mixer, before the addition of water. This is followed by sand and then fly ash. The raw materials are mixed in the pan mixer for 10 minutes. From the pressing machine, the final bricks are taken and stacked for curing and drying. After the second day, water is sprinkled over the bricks and is cured for 15 days. After 15 – 20 days of production, the fly ash bricks are sold in the market at a price of Rs. 2 rupees per brick. Mostly the bricks are used in building construction.