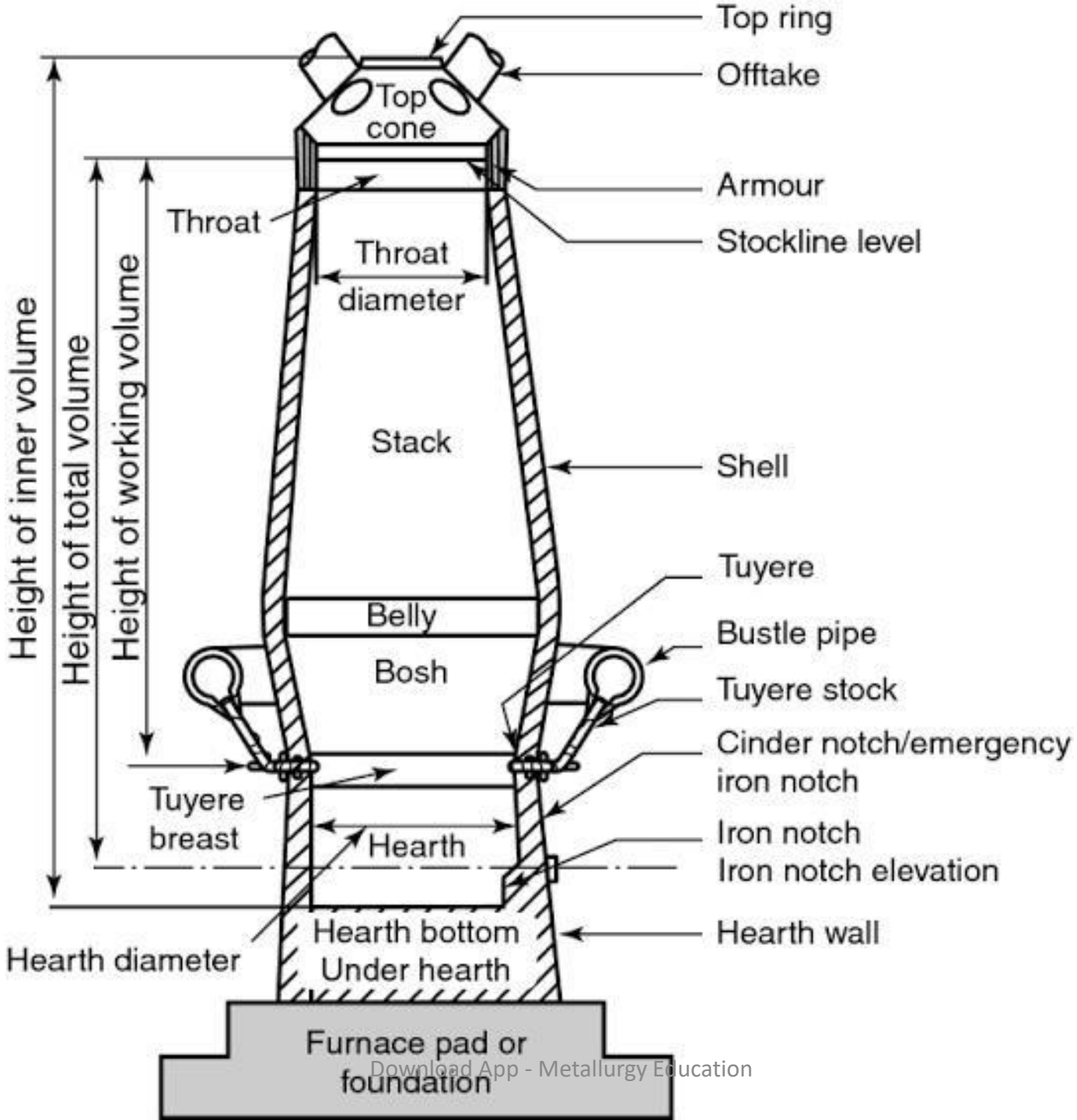
BLAST FURNACE OPERATION

BLOWING IN

The process of starting a newly lined furnace is called **blowing in.** In general the operation involve 4 main steps

1. Drying
2. Filling
3. Lighting and operation until normal production established



1. DRYING

The new lining of a furnace contains a significant proportion of moisture which must be slowly and completely remove before the temperature of the Furnace is raised. This operation is known as drying in which the Furnace is slowly heated.

Blast furnace drying can be completed by anyone of the three different techniques

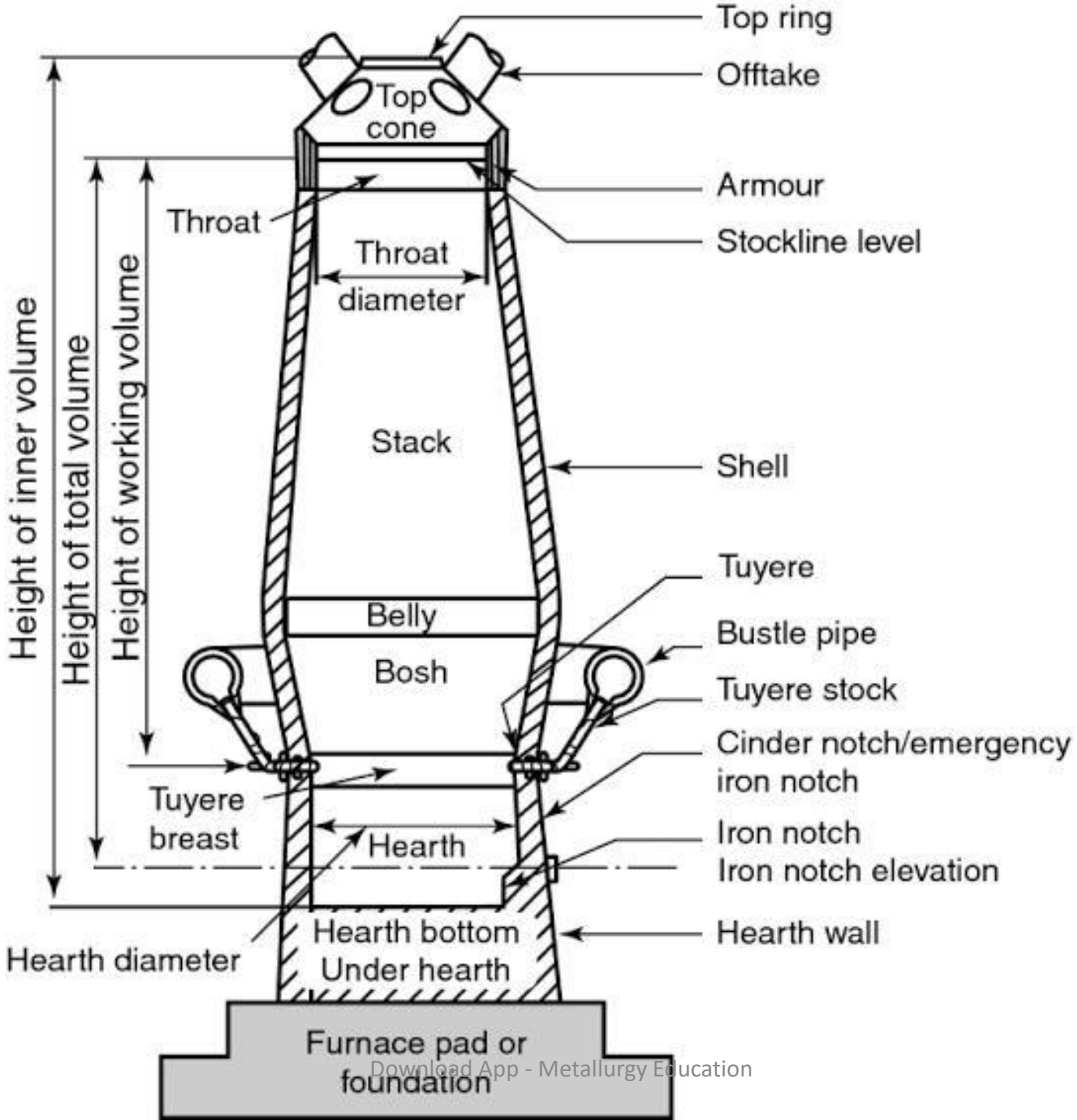
1. Supply of hot blast from the stove
2. Use of a Dutch oven as an auxiliary furnace to generate and supply hot gases
3. Use of wood or coke fire on the hearth

2. FILLING

At the end of drying furnace is cleared off. The coolers are turned on and once the inside temperature is tolerable furnace personel can get in and prepare for filling the Furnace. All equipments and coolers are inspected since any rectification required is readily possible at this stage.

Fill the hearth with light kindling wood and shavings saturated with oil up to the tuyere level and laying over this a scaffold of old timber slippers.

Coke is charge above the timber scaffold from the top up to the bosh level. A quantity of limestone sufficient to flux the ash in the charge coke is also charged along with coke.



Small amount of old blast furnace slag is also incorporated with coke after the coke level raises beyond the mental level. The early slag volume is deliberately maintain at high level to heat up the hearth and prepared to receive iron.

After that light burden charges of stone and coke that is the ratio of iron ore to coke is low about 0.6 to 0.6. Burden weight that is iron ore is increased every 8 to 10 charge in increments of approximately 0.03 - 0.05 ratio of iron ore to coke. The furnace is now ready to be lighted or ignited.

3. LIGHTING AND OPERATING UNTIL ROUTINE PRACTICES ESTABLISHED

The Furnace is lighted either by inserting red hot bars through the tuyeres or slag hole and iron notch. Alternatively gas torch may also be used. Generally high combustible material is kept in front of the tuyere during filling to light the furnace readily.

Burning is allowed with natural draught alone for the first 24 to 36 hour. A light blast is put on only thereafter. As soon is good amount of gas emergence from the furnace top the bells are closed and the dust catcher dump valve is slowly opened to conduct exist gas through the gas cleaning system.

The blast volume is fairly rapidly increased to normal volume of blowing.

Tap holes are kept open for hot gases to scape out during the early period. Once the sudden decrease in the outcoming gases through the tap holes is taken as an immediate indication of beginning of slag accumulation in the hearth and the tap hole is immediately closed thereafter.

After nearly 2 days as the ratio of iron ore to increase in the burden, first cast maybe done. The amount of slag and metal flowing out of the Furnace is correlated to the charge schedule and proportion in order to access the progressive blowing in operation.

BANKING

After blowing in, furnace is expected to run continuously for 5 to 7 years. A furnace however at times may have to be shut down for an extended period during the campaign for variety of reasons like labour trouble, shortage of raw materials, serious breakdowns and so forth.

Since the furnace cannot be put on or off readily, the furnace needs to be prepared for such a temporary shut down so that when production is to be reassumed it can be done with minimum of efforts and wastage. The temporary shutdown of the blast furnace is known as banking.

During banking reduction in combustion rate achieved by extinguishing the fire but taking blast of, covering the fire with access coke, luting up all air inlet and smoothing the stock with fine materials. In general a blank charge of coke is put to blank a furnace.

The Furnace is restarted by replacing the tuyere and notches and charging sufficient coke to fill up space created by the sinking of the stack.

BLOWING OUT

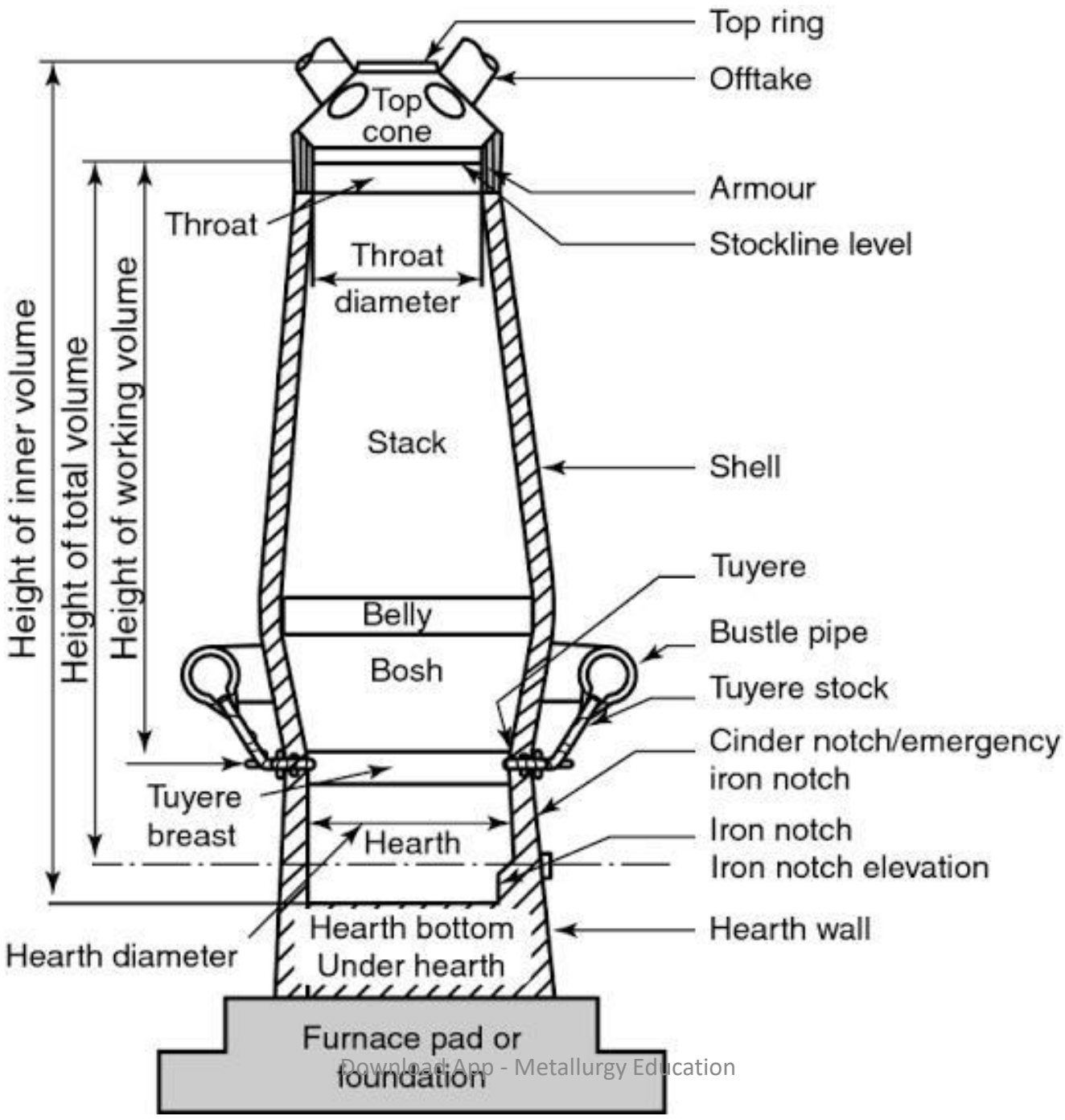
The process of stopping the Furnace operation at the end of it's complain is known as blowing out it is accomplished by two ways

1. Charging is stopped and the stock is allowed to descend until minimum of it remains inside. As the stock sink blast is reduced and the top of the stock is cooled by water spray inserted through the top.

The last cast is carried out as completely as is feasible. Towards the end the remaining stock is quenched with water and the Furnace become cold in about 24 hours.

2. In the alternative method the blowing out start with a blank Coke charge followed by charge of clean silica gravels of + 25 mm and - 50 mm size. The stock level kept at the normal level in the beginning but later on it is allowed to sink.

Water is sparingly used to control the stock line temperature. The blast volume is not reduced to the extent done in after mentioned method. The left over gravels are washed with water in the end. the time required for blow out is very short generally about 6 to 8 hours.



TAPPING

The metal and slag are removed from the furnace periodically when the furnace is in operation. The time interval between two tapes depends upon the production rate and size of the Furnace.

From usual amount of charge materials put into the furnace producs nearly 300 to 700 kg slag. For tapping, tap hole drill with the help of machine. After tapping tap hole closed by using refractory.

In early blast furnace two separate holes are provided for slag and metal. Now a days single tap hole is used.

FANNING

If the full production capacity of the furnace is not required for any reason, It is decreased by reducing the blast input. If the blast is reduced to a value less than 25% of the normal volume this technique is known as **fanning.**

This is far better than total shutting of the blast because normal production can thereby be resumed without any difficulty

BACK DRAUGHTING

Whenever the Furnace is required to be put off the blast for a short duration of an hour or 2 to repair the tuyere or the skip or the coolers etc. It is back draughted. The blast is put off and the bustle pipe is put under negative pressure to force furnace gases to flow inverse direction into the stove where it is burned.

THANK YOU