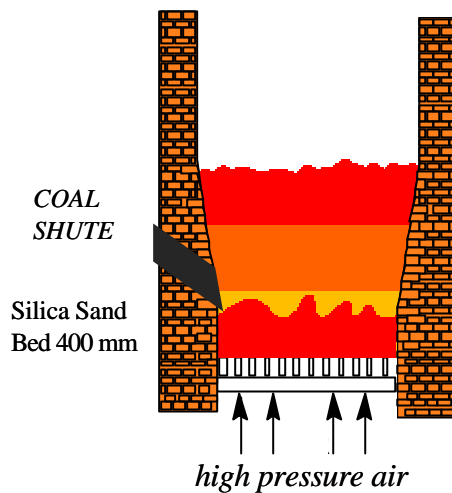


PRINCIPLE OF FLUIDIZATION



When a bed of fine particles, for example sand, is subjected to an upward stream of air, the particles become suspended as the airflow reaches a certain velocity. This condition is referred to as the minimum fluidizing velocity and it varies according to the particle size and the depth of the bed. When the bed is fluidized it resembles a boiling liquid. Such a turbulent mass of solid particles is named a fluidized bed. Coal can be fed into the bed and as it burns it resembles molten lava. If the gas velocity becomes too high, then the particles are entrained in the gas stream and are lost. A fluidized bed behaves like a liquid, so both the bed level and temperature can be easily controlled.

Coal fuel enters the furnace slightly above the fluid bed splash zone where the rising stream of air and combustion gases burst from the sand bed. The vigorous action of the bed causes the fuel to rapidly mix and be quickly raised on temperature to its igniting point. Solid fuel particles mixing with the rising air stream are jostled by the hot bed material (sand, ash & fuel) causing rapid release of surface moisture and volatile matter from within the fuel.

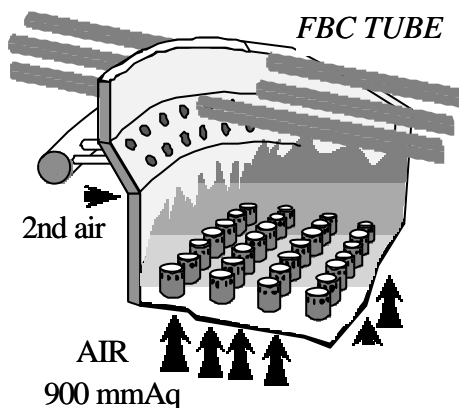
The relatively large mass of moving bed material continually exposes new surfaces of the fuel particles for combustion, sustaining the rapid combustion within the bed. The rapid combustion enables very good load response to be maintained. (Closely approaches that of oil fuel)

WHEN the fluidized bed design is compared with conventional grate systems the following specific capabilities of the former enable a practical unattended control procedure (automatic controls) to be devised and implemented;

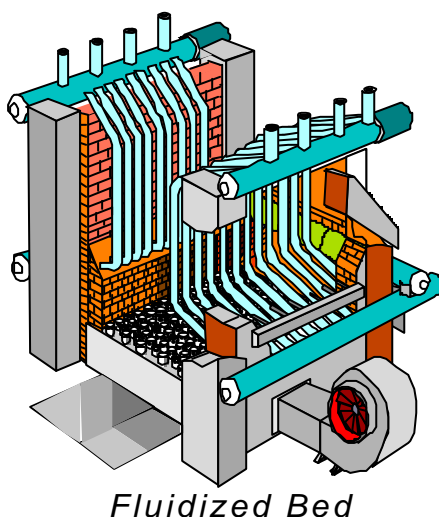
Combustion temperatures are significantly lower and thus much safer conditions are continually maintained (well under 1000 oC)

The nature of a fluid bed ensures that mal-distribution is not likely to occur. Fuel migration through the bed is fast and even. Air distribution is insured by the designed configuration and location of the air nozzles.

The bed combustion can be stopped instantly by turning off the air supply to the bed. This action results in the bed slumping, thereby smothering combustion. The bed is inherently safe because it contains only 3-5% combustible material as a maximum. This is evenly distributed throughout the inert bed material. When slumped, the bed is safe and permits an easy restart even after several hours simply by re-introducing the airflow into the bed. This is possible because of the substantial quantity of entrained heat in the bed material.



FLUIDIZED BED UNIT



The furnace is located atop the air distribution plenum. It has an overall freeboard height of about 5 meter. At its base, an assembly of In-bed tubes are positioned so that at maximum steam output they are fully immersed in the expanded fluidized bed. As the fluidizing air supply is decreased, the expanded bed depth is reduced and the in-bed tubes are progressively uncovered such that at all outputs approximately 50% of the heat release by combustion is transferred to the in-bed tubes when burning coal fuel. This allows a turndown of at least 3:1 at near constant excess air with the entire bed in operation. Co-efficiency of heat transfer