



Direct from DRI



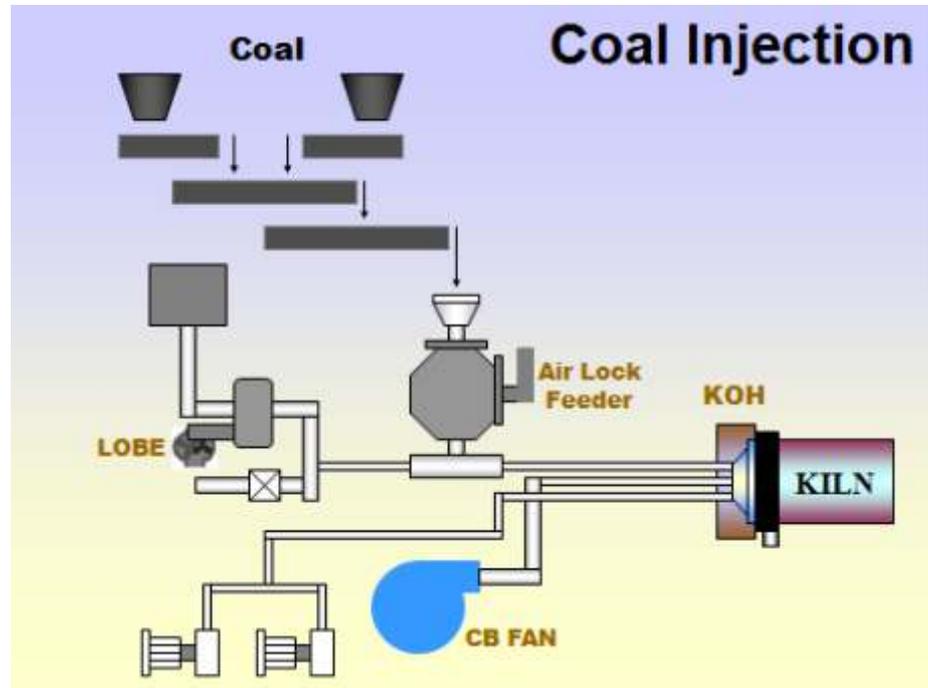
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Coal Injection in Rotary Kilns as a tool to Improve the Kiln Productivity

Injection in rotary kilns. Coal injection is provided in most of the operating rotary kilns in India. But the facility is not being fully exploited for its potential delivery on productivity. Many of the important steps in the injection process are not installed or not operated.

The wet coal is fed into a crusher along with hot gases drawn from the process. The hot gas temperature is controlled by air bleed. The coal is simultaneously dried and ground in the hot air in the coal mill. The coal mill usually is a hammer mill or a ball mill. The ground particles and air are swept by the primary air fan and delivered to the burner as a dilute suspension of coal and air. A combination of carbonaceous substances can also be injected.

What is being visualised is the firing of a mix of moisture laden coal and char/coke in a proportion chosen, for economic, and for environmental consideration. It is important to ascertain the conveying velocities above the saltation velocity. Low transport velocities or excessively high solids loading results in unstable operation. If the gas velocity in a pipe is reduced progressively, particles will eventually settle. The minimum velocity at which

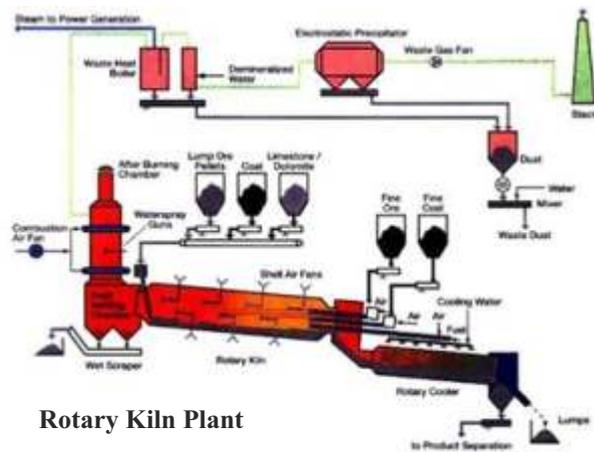


settling occurs is called the saltation velocity. The pipe needs to be smooth and sufficiently sized and not have sharp bends to keep saltation velocity low. Other major factor of influence on required velocity are the particle size, but more importantly, the gas/solid loading. Minimum transport velocities

should also increase but not proportionately. So therefore, as the coal feed is increased, the transport velocity increases but the air-to-coal ratio decreases. At maximum coal flow, the air-to-coal ratio reaches its minimum, around 1.6:1 wt/wt, and the flow velocity reaches its maximum. Hence by a combination of suitably sized pipework and suitably controlled air-to-coal ratios, a system should be operated so that the velocity at minimum throughput is at least 15 m/s and around 25 m/s at maximum throughput.

recommended based on coal milling experience are 15 m/s with a specified minimum air temperature at the mill of 60°C. The minimum figure for air velocity applies to the lowest coal throughput, which is about 30–40 percent of the maximum coal throughput depending upon the turndown ratio. As the coal loading is increased, the airflow

It is important to have hot gases in the mill, else the moisture level in the coal also influences the stability of the coal injection and thereby the stability of the kiln operation. It is also important to keep the air to coal ratio at the lowest to exploit the system capability. A 350 tpd kiln for DRI can hit higher than 500 tpd production by such exploitation.



Rotary Kiln Plant