Circulating fluidized bed combustion technology applied

Technology

The bed agglomeration can be controlled by peeping the bed alkali contents low enough by regularly discharging the bed ash and feeding fresh sand into the bed. The chemistry of fuel ash - bed sand interactions is however complicated. It is usually useful to minimize the quartz contents in the make-up sand. The ash melting point temperatures of woody fuel ashes vary in a wide range. The wide range correlates with variations in ash composition.

In general, the higher the fuel alkali and chlorine contents, the lower are the sintering and initial deformation temperatures. Wood ash starts to form agglomerates and to sinter between 900 co and 1000 co in combustion conditions. Coal and peat ashes are usually trouble free at these temperatures, even if the melting point temperatures are in the same range with biomass fuels. Coal or peat is co-fired with biomass in many multi-fuel fired boilers. The woody biomass ashes are in general much more reactive than the ashes of fossil fuels.

Lower reactivity of coal and peat ashes is connected to a composition with mainly quartz and various silicate-based minerals, like aluminum silicates, calcium silicates and alkali silicates, and iron oxides. Calcium and al kali in these minerals are not in free, reactive form like they are in biomass ashes. Accordingly they are quite inert at the conditions of fulfilled bed combustion. Even though combustion of woody biomass fuels is more challenging compared to coal and peat wood combustion technologies are nowadays well established owing to continuous boiler and material development.

Thanks to a good operational practice developed by experiences, nowadays a number of woody biomass fired boilers are successfully operated by skilled

operators with high availability, over 8000 h/a, for example in the pulp and paper industries. This know-how comes from a lot of learning. When woody biomass fuels are fired in high efficiency boilers with high team temperatures and pressures, the negative properties of biomass fuels and their ashes are amplified.