2013

Development and Large-Scale Optimization of Fluidized-Bed Steam Drying of Lignite

Hans-Joachim Klutz
RWE Power AG, Germany

Joachim Werther
Hamburg University of Technology, Germany

Development and Large-Scale Optimization of Fluidized-Bed Steam Drying of Lignite

Hans-Joachim Klutz
RWE Power AG
Cologne, Germany
Joachim Werther
Hamburg University of Technology
Denickestr. 15, Hamburg, D-21073 Germany

Increasing the efficiency of coal-fired power stations is a major step towards reducing the CO_2 emissions from electricity production. Present-day technology of coal usage in power stations is that the coal is dried in the mill and the steam is passing through the boiler. Considering the fact that European lignite has an average water content of 50 – 60% this means that between 13 and 20% of the coal supplied to the boiler is used up by the energy consumption of the drying process and does not contribute to electricity generation. Predrying of the coal provides therefore the perspective of a drastic increase of the efficiency of the electricity generation.

RWE Power AG is developing a steam drying technology for lignite. The development started two decades ago and has after passing over several pilot plant stages now reached the large scale with a demonstration plant for steam drying of 200 t/h raw coal. Hamburg University of Technology has accompanied this development with cold model work.

The basic challenge of this technology is to operate a fluidized bed of brown coal with a depth of 4 m and a cross-sectional area of 64 m^2 which is tightly packed with heat exchanger bundles. The steam generated by the drying coal leads to an increase of the fluidizing velocity with height. An optimization was necessary to find a fluidization velocity at the distributor level which is sufficiently high to keep the bottom bed well fluidized but not too high to lead to excessive entrainment from the top of the bed.