



**The 22nd Polish Conference of Chemical
and Process Engineering**
Spała, 5-9 September, 2016



Simulation of air drying of lignite in a fluidized bed

Zdzisław Pakowski

Lodz University of Technology, Faculty of Process and Environmental Engineering,
213 Wolczanska Str., 90-924 Lodz, Poland

Corresponding author: zdzislaw.pakowski@p.lodz.pl

Key words: drying lignite

Lignite is a primary energy resource in Poland. With large deposits still not exploited it will remain at its leading position for many years to come. Lignite is excavated at moisture content between 50 and 60% and before combustion it is predried in inefficient mill and pneumatic dryers. This lowers the possible energy efficiency of a power plant by ca. 10%. Energy efficient predrying of lignite can eliminate this deficiency. Two main routes are envisaged so far: superheated steam drying (SSD) with heat recovery from condensate or using the waste hot air or flue gases. Using waste hot air contrary to SSD has not been adequately studied. This paper presents four basic simulations of a fluid bed dryer for lignite: multisection plug-flow type with or without internal heat and mass transfer resistance in the particle and continuous stirred tank type with or without internal heat and mass transfer resistance in the particle. In all cases the models are formulated and solved. Critical points of numerical algorithms are disclosed. On the basis of numerical solutions pros and cons of each type are discussed.