

## **CONDITIONING MONITORING AND FURNACE OPERATION AND DESIGN**

### **(708) - INFLUENCE OF POTASSIUM IN INDUSTRIAL SCALE FLUIDIZED BEDS**

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#### **Draft Paper**

#### **Influence of potassium in industrial scale fluidized bed combustors and gasifiers**

Potassium is a well-recognized villain among the ash components found in biomass being the cause for bed agglomeration and contributing to fouling and corrosion. In the Chalmers 12 MW<sub>th</sub> CFB Boiler, the fate and the impact of potassium was investigated by means of measurement of gaseous KOH via UV-spectroscopy. A specific focus was put on the effect of enrichment of potassium in the bed material which was linked to a disturbed CO-combustion at the boiler outlet. Several 100ppm of CO could be measured, which were unaffected by changes in both excess oxygen or variation in air staging. The effect could be mitigated by both the addition of fresh silica sand to the bed or by the addition of sulfur to the cyclone outlet. The devastating effect of potassium hydroxide (KOH) on the CO oxidation mechanism could be established in lab scale experiments mimicking the prevailing conditions in the cyclone outlet of a CFB boiler [Berdugo et.al. Fuel, Volume 273, 1 August 2020, 117762]. Through application of UV-spectroscopy measurements in the inlet of the convection path of the 12MW<sub>th</sub> CFB boiler the correlation could be confirmed to be valid even under industrial conditions in full scale.

This work gives a comprehensive overview on the effects of potassium on the CO-combustion in a DFB bed system; presenting how the measurement of gaseous KOH links the state of silica based bed materials to its propensity to agglomerate and thus the requirement for replacement of bed material.

**Palavras-chave : potassium, CO-burnout, bed material, fluidized bed**