

Development of Slagging/Fouling Prediction Tool for Large Scale Boilers Fired with Coal Blends

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Slagging/ fouling is still a very common operational problem in many pf coal fired boilers due to increased interest in utilization of lower quality, usually cheaper coals, varied quality coal blends fired and biomass/ waste fuels co-firing. It was proved that conventional indices fail when used for coals of different origin and coals blends as they do not include the non-additive ash interactions and do not take into account the boiler firing system design and operation parameters, leading to inaccurate predictions. Therefore, there is a need to develop reliable slagging/ fouling predictive indices valid for fuel blends which depend on the boiler design, operational conditions and fuel properties.

The developed predictive engineering tool integrates a one-dimensional zone model of a boiler to determine the heat transfer conditions and mid-section temperature profile throughout the boiler, with the phase equilibrium–based ash deposition mechanistic model that utilizes thermo-chemical data. The designed model enables advanced thermal analysis of a boiler for investigating the impact of fuel switching on boiler performance including the ash deposition effects. Inside the tool the extended fuel and results databases have been incorporated which enables the optimization of fuel blends composition to minimize slagging/ fouling and achieve best boiler performance. Gathered during boiler measurement campaigns boiler operational and process data have been used to validate the applied zone-based model.