

## CFD Modeling of Stripper Ash Cooler of Circulating Fluidized Bed

**Authors :** Ravi Inder Singh

**Abstract :** Due to high heat transfer rate, high carbon utilizing efficiency, fuel flexibilities and other advantages numerous circulating fluidized bed boilers have grown up in India in last decade. Many companies like BHEL, ISGEC, Thermax, Cethar Limited, Enmas GB Power Systems Projects Limited are making CFBC and installing the units throughout the India. Due to complexity many problems exists in CFBC units and only few have been reported. Agglomeration i.e clinker formation in riser, loop seal leg and stripper ash coolers is one of problem industry is facing. Proper documentation is rarely found in the literature. Circulating fluidized bed (CFB) boiler bottom ash contains large amounts of physical heat. While the boiler combusts the low-calorie fuel, the ash content is normally more than 40% and the physical heat loss is approximately 3% if the bottom ash is discharged without cooling. In addition, the red-hot bottom ash is bad for mechanized handling and transportation, as the upper limit temperature of the ash handling machinery is 200 °C. Therefore, a bottom ash cooler (BAC) is often used to treat the high temperature bottom ash to reclaim heat, and to have the ash easily handled and transported. As a key auxiliary device of CFB boilers, the BAC has a direct influence on the secure and economic operation of the boiler. There are many kinds of BACs equipped for large-scale CFB boilers with the continuous development and improvement of the CFB boiler. These ash coolers are water cooled ash cooling screw, rolling-cylinder ash cooler (RAC), fluidized bed ash cooler (FBAC). In this study prototype of a novel stripper ash cooler is studied. The Circulating Fluidized bed Ash Coolers (CFBAC) combined the major technical features of spouted bed and bubbling bed, and could achieve the selective discharge on the bottom ash. The novel stripper ash cooler is bubbling bed and it is visible cold test rig. The reason for choosing cold test is that high temperature is difficult to maintain and create in laboratory level. The aim of study to know the flow pattern inside the stripper ash cooler. The cold rig prototype is similar to stripper ash cooler used industry and it was made after scaling down to some parameter. The performance of a fluidized bed ash cooler is studied using a cold experiment bench. The air flow rate, particle size of the solids and air distributor type are considered to be the key parameters of the operation of a fluidized bed ash cooler (FBAC) are studied in this.

**Keywords :** CFD, Eulerian-Eulerian, Eulerian-Lagrange model, parallel simulations

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