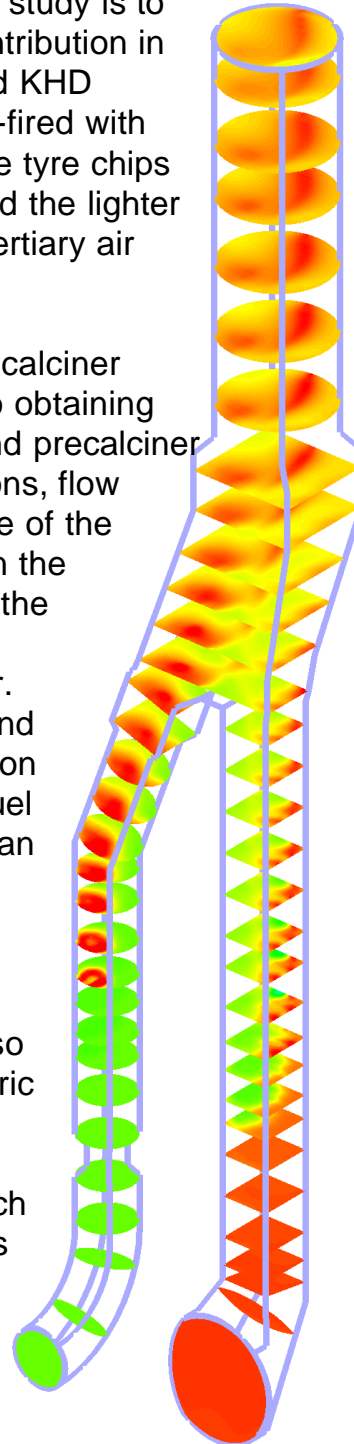


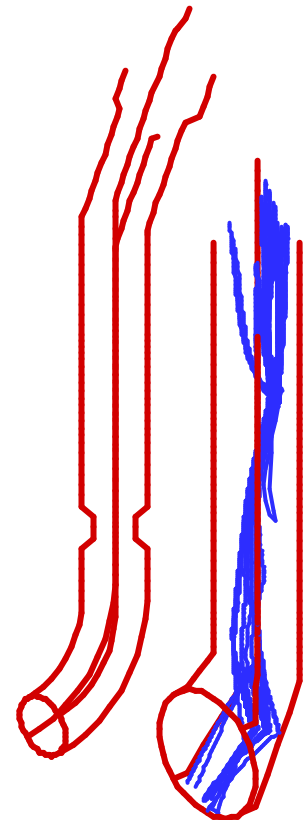
Optimisation of Alternative Fuels in a KHD Calciner

The primary aim of the mathematical study is to increase the waste derived fuels' contribution in a low-NO configuration of a coal-fired KHD pre-calciner. The waste fuels are co-fired with coal in two parallel ducts 'legs': waste tyre chips and diaper cubes in the riser duct and the lighter wood chips and plastic disks in the tertiary air duct.

Model simulations of the kiln and precalciner have been performed, subsequent to obtaining all the model inputs related to kiln and precalciner boundary conditions, fuel specifications, flow rates and preheat temperatures. One of the major operational problems has been the dropout of semi-burned tyre chips in the tertiary air duct and the consequent blocking of the passage of tertiary air. Through improvements to the riser and tertiary air joining area and introduction of a refractory tier below the waste fuel firing location of the tertiary air duct, an enhanced waste fuel proportion has been achieved (from 20% to nearly 50% of the total pre-calciner thermal input). The optimisation of waste fuel particle size and firing ratios have also established through several parametric simulations. An additional advantage has been the reduced energy loss in clearing the tertiary air blockage which has been carried out on regular basis prior to the introduced modifications.



Temperature profile



Waste fuel particle