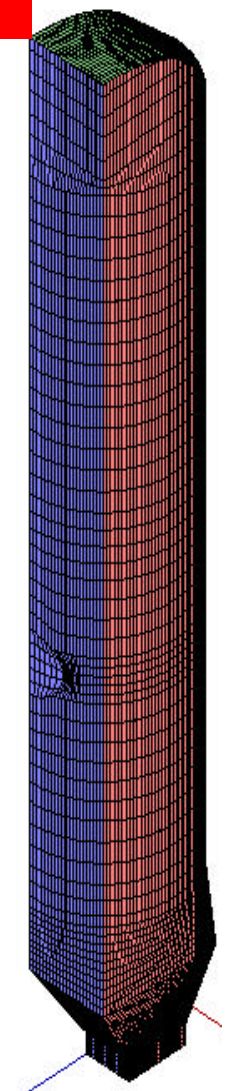
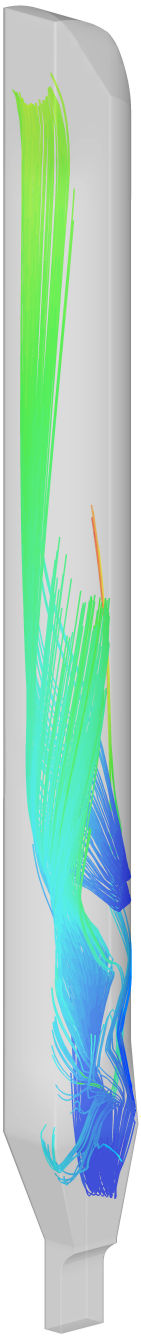
Increase of Over 60% in Waste Tyres in a Polysius Calciner

A coal-fired Polysius pre-calciner has been modified to co-fire waste tyre and wood chips with coal in order to reduce the fuel costs. Plant engineers have been particularly interested to find out if the tyres will burn within the upward flow of kiln gases and rise against the hot material or eventually descend semi-burned into the riser throat. They are also interested in the resulting thermal profile in the pre-calciner riser duct with the introduction of tyre chips. There is also a concern over a possible build-up problem between the riser and the kiln due the fall out of larger tyre chip particles and over the most appropriate tyre-chips injection locations and particle size distribution.

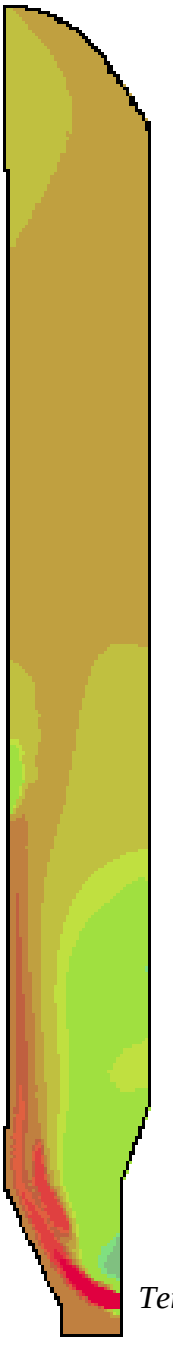
The consultancy study started with the data collection campaign, which was required for the pre-calciner model inputs, followed by the simulation of the pre-calciner for a number of waste tyre chip injection locations, particle sizes, riser duct velocity variations and thermal load of tyre chips. The recommendations include the incorporation of a refractory cast restriction platform into the riser duct in order to enhance the velocity of the kiln gases so that all the tyre chip particles may be fluidised and refrain from dropping down into the kiln inlet. However, model has indicated that a few larger particles would still fall through the upward flow without being entrained. A detailed tyre chips de-volatilisation and residence time analysis suggested a need to raise the tyre chip injection location 9 meters higher than the original one. These modifications were implemented and as a result the tyre chip feed increased from 2 to 7 tonnes per hour, an increase of pre-calciner tyre thermal contribution from 20% to over 60%.



Grid arrangements



Waste fuel particle trajectories



Temperature profile

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