A Case study of plant A is presented, where both kiln and calciner were modeled and compared with Plant B. The objectives of the study were to reduce calciner builds-ups and kiln CO emissions. Plant A operates at higher (5-7%) Oxygen levels near the kiln feed-end, in order to maintain lower CO emissions. Plant A had two options either to operate at higher excess air levels for acceptable CO emissions or to subsequently oxidize CO in the calciner. The latter option is adopted, enabling plant A to reduce heat losses and kiln instability issues.

Detailed modeling results show that the tertiary air off-take from the kiln hood induces a higher secondary air velocity at one side of the kiln burner, giving rise to swirl that results in coal and O₂ segregation, thereby producing higher kiln feed-end CO. In the study, a refractory vortex breaker wedge for the kiln hood and a pyramid shaped structure for the calciner are found to be the most feasible modifications for reducing kiln generated CO emissions and semi-burnt tire chips build-ups. The computed results are compared with Plant B, which has a similar calciner configuration.