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Finite element modelling of thermal stress on lining of a crucible furnace

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The objectives of the research reported herein was to determine the composite wall of a crucible furnace for a contained heat and reduced heat loss to the ambient using Finite Element Method (FEM) considering transient heat conduction. This paper presents findings on heat transfer characteristics of a crucible furnace wall designed and constructed for the smelting of aluminium scraps in artisanal casting of three legged aluminium pots. The approach would be extended to a static kiln cylindrical hollow furnace for clinkers production from carbonates locally found in remote rural areas. Thermal stresses experienced by the lining (concrete and ceramic refractory materials) of crucible furnace was modelled and simulated using finite-element method. The findings permitted to perform the structural analysis for the determination of thermal stress in different working condition and ascertain the appropriate lining materials for the used heating material (coal, firewood, cow dung, macadamia nut shells, or a combination of the above).

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD, N/A)?

N/A

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