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Optimized Design, Material Selection, and Improvement of Liners, Mother Plate, and Stone Box of a Direct Charge Transfer Chute in a Sinter Plant: A Computational Approach

Authors : Anamitra Ghosh, Neeladri Paul

Abstract : The present work aims at investigating material combinations and thereby improvising an optimized design of liner-mother plate arrangement and that of the stone box, such that it has low cost, high weldability, sufficiently capable of withstanding the increased amount of corrosive shear and bending loads, and having reduced thermal expansion coefficient at temperatures close to 1000 degrees Celsius. All the above factors have been preliminarily examined using a computational approach via ANSYS Thermo-Structural Computation, a commercial software that uses the Finite Element Method to analyze the response of simulated design specimens of liner-mother plate arrangement and the stone box, to varied bending, shear, and thermal loads as well as to determine the temperature gradients developed across various surfaces of the designs. Finally, the optimized structural designs of the liner-mother plate arrangement and that of the stone box with improved material and better structural and thermal properties are selected via trial-and-error method. The final improvised design is therefore considered to enhance the overall life and reliability of a Direct Charge Transfer Chute that transfers and segregates the hot sinter onto the cooler in a sinter plant.

Keywords : shear, bending, thermal, sinter, simulated, optimized, charge, transfer, chute, expansion, computational, corrosive, stone box, liner, mother plate, arrangement, material
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