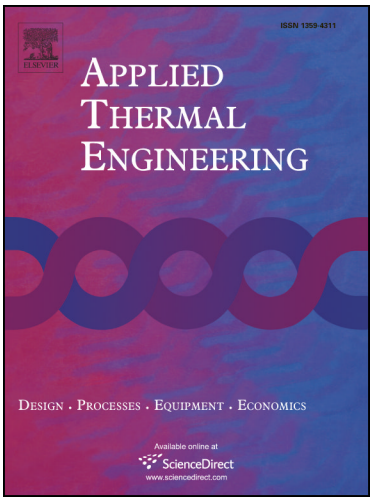

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Dynamic simulation of an electric arc furnace waste heat recovery system for steam production

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Abstract

Electric arc furnace waste heat recovery has a high potential for increasing the efficiency and sustainability of steel plants. Normally the off-gases are cooled down inside a water cooled hot gas duct to the maximum allowed temperature of the following dust filters. The ambient air or near rivers are acting as heat sink and therefore the thermal energy is not utilized. In the present work, a dynamic model of a waste heat recovery system for steam production is developed and investigated within the commercial simulation software Advanced Process Simulation Software (APROS). Due to the batch wise charging and melting procedure of the electric arc furnace, it is necessary to integrate a thermal energy storage to achieve a constant production of steam. The developed model contains the whole heat recovery system including heat exchangers, steam generators and a thermocline storage tank, acting as thermal energy storage. In this paper the dynamic behavior of the waste heat utilization plant is documented and analyzed. The different case studies simulation results help to optimize the operating parameters and furthermore, they help to increase the plant safety as well as the profitability of the waste heat recovery system. It can be shown, that the recovered waste heat can be utilized as saturated steam within the steam net, without any side effects on the availability of the electric arc furnace.

Keywords: Dynamic simulation, Electric arc furnace, Waste heat recovery,

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