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On the Exergy Analysis of the Aluminum Smelter

Authors : Ayoola T. Brimmo, Mohamed I. Hassan

Abstract : The push to mitigate the aluminum smelting industry's enormous energy consumption and high emission releases is now even more persistent with the recent climate change happenings. Common approaches to achieve this have been focused on improving energy efficiency in the pot line and cast house sections of the smelter. However, the conventional energy efficiency analyses are based on the first law of thermodynamics, which do not shed proper light on the smelter's degradation of energy. This just gives a general idea of the furnace's performance with no reference to locations where improvement is a possibility based on the second law of thermodynamics. In this study, we apply exergy analyses on the pot line and cast house sections of the smelter to identify the locality and causes of energy degradation. The exergy analyses, which are based on a real life smelter conditions, highlight the possible locations for technology improvement in a typical smelter. With this established, methods of minimizing the smelter's exergy losses are assessed.

Keywords : exergy analysis, electrolytic cell, furnace, heat transfer
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