Optimization of Steel Production to Improve Lifecycle Environmental Performance

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Abstract

To reduce lifecycle impacts, manufacturers require an understanding of how design, manufacturing, and other decisions influence their eco-footprint across all product lifecycle stages, e.g., manufacturing, use, and end-of-life. However, few tools exist to address manufacturing impacts on the environment. For many products, steelmaking accounts for the majority of manufacturing energy use, with process wastes also representing significant concerns. A predictive model for a steelmaking electric arc furnace (EAF) is briefly described and is then used to illustrate how environmental performance can be optimized for a given steel alloy. Process inputs are identified that minimize a variety of environmental measures.

Keywords: Lifecycle; Decision making; Steelmaking