Modelling and Simulation of the Electric Arc Furnace Processes

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Current market demands on steel quality, price and production times dictate the introduction of several technological innovations regarding the electric arc furnace (EAF) steelmaking. One of the fields, which is rapidly developing and has a significant potential is related to the advanced software support of the EAF operation, which combines data acquisition, advanced monitoring and proper control of the EAF. This paper briefly presents the idea and development of all key EAF-process models, which are together with measured EAF data used to estimate the unmeasured process values. The models are based on fundamental physical laws and are implemented mainly using non-linear, time-variant ordinary differential equations. The validation results that were performed using operational EAF measurements indicate high levels of estimation accuracy and the final outcome of the study results in a fully operational EAF model, describing all crucial steel-recycling processes. The accuracy of the presented models is in the range of +/- 15 K for steel temperature and +/-10 % for steel composition. Therefore, the versatility and accuracy of the models allows the usage of the models in broader software environments in a form of soft sensors for process monitoring, process optimization and operator decision support.

Brief Bio

Vito Logar is an Assistant Professor at the Faculty of Electrical Engineering, Univ. of Ljubljana. He is working on the described area for many years in several projects. So his research interests include modelling and optimization techniques regarding the electric arc furnace steel recycling processes. In 2013 he received the award for outstanding scientific achievement for the year 2011 from the Slovenian Research Agency (ARRS). In 2014 he received the award for outstanding scientific and pedagogic achievements from the University of Ljubljana. He is currently also the president of the Slovenian society for modelling and simulation SLOSIM.

More info on EAF modelling and simulation: **EAF Simulator**

More info on the research: **ResearchGate**