

SIMULATION AND OPTIMISATION OF CASTING, ROLLING AND HEAT TREATMENT PROCESSES FOR COMPETITIVE PRODUCTION OF TOPMOST STEEL

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Abstract. An overview of research and development towards establishing a multiscale numerical model of the production chain of steel semiproducts is presented. Process steps of continuous casting, hot rolling and heat treatment are considered. The final goal of the modelling is the prediction of the product properties as a function of the process parameters of each process step. This is achieved by the coupled physical models of relations between the process parameters and the product macrostructure, microstructure and the product properties. The physical modelling of the microstructure evolution is complemented, replaced or tuned by the artificial intelligence methods. The process is optimised through minimization of two weighted objective functions: the macroscopic one, taking into account the factors such as process productivity, usage of the machines and use of energy and cooling agents, and the microscopic one, taking into account the product properties as a function of the microstructure. Experimental validation of the models is described. Several simulation and optimisation examples, associated with the production chain in Štore Steel company are shown.