ABSTRACT

Run-out Tables, or ROTs, have been used by several sectors for an extended period to achieve diverse microstructures of steel. One of the key factors affecting the final microstructure is the cooling rate, which is controlled by several parameters associated with the Run-out Tables. However, a significant portion of previous studies has focused on various aspects, such as the metallurgical behavior, stress development within the strip, and temperature distribution during the cooling process on the Run-out Table. The aim of this research is to establish a concrete connection between the cooling rate of the hot strip and other independent experimental variables that can be adjusted. This understanding will facilitate the regulation and enhancement of the cooling rate on the Run-out Table.

Experiments were carried out on the Laboratory Scale Run Out table as part of the first phase of this research project. The aim of these experiments was to investigate the nature of the interrelationships among the various experimental parameters. In the second part of this dissertation, two distinct datasets have been selected from the observed data. Each of these datasets has a different combination of factors not seen in the other datasets. In order to checking the consistency of the experimental data, an Artificial Neural Network (ANN) was used before proceeding with the process of establishing the correlation. Two distinct sets of experimental data, including dependent and independent variables, have been used to verify the consistency of the experimental configuration. Both sets of data show great consistency throughout the process, demonstrating substantial progress in this research, particularly in connecting the dependent and independent parameters in the final phase. The experimental data has been used to analyze the cooling rate of the specimen in the third portion of this research.

Three regression models were used to determine the relationship between two verified data sets using regression analysis in the final step of this study. Each of three models shows good agreement for both sets of data. Out of the three models, linear regression model analysis is prioritized above nonlinear regression analysis owing to the fact that it is easier to use and provides more accurate results. According to the findings of this research, for the first and second data sets, the independent variables account for 94% and 95% of the dependent variable, respectively. The effect of every independent parameter on the cooling are highlighted.