

## ABSTRACT

Homogenization in the aluminium industry is a crucial stage aimed at reducing the uneven distribution of additional components and enhancing the uniformity of the microstructure within billets. Accurate temperature control during the homogenization process is essential to ensure the quality and consistency of the final product. Uncontrolled temperatures can lead to decreased material hardness and reduced product quality. Conventional temperature control methods, such as manual observation and traditional measuring instruments, often lack precision, increasing the risk of overheat treatment that can negatively affect mechanical strength and billet quality. This study aims to explore the relationship between air temperature and billet temperature during the homogenization process by utilizing real-time data from digital monitoring systems. This system collects temperature data automatically and in real-time, which is then analyzed using mathematical models to understand the impact of air temperature on billet temperature. Robust regression analysis results show that the air temperature at point AT2R has the most significant influence on billet temperature. Model evaluation reveals a MAPE of 5.31% for training data and 2.83% for testing data, indicating excellent forecasting capability. The RMSE values are 37.06 for training data and 14.19 for testing data, showing better prediction accuracy on testing data. R-squared values of 0.73 for training data and 0.90 for testing data demonstrate that the model is highly effective in explaining data variation and providing accurate predictions.

***Keyword: homogenization aluminium, Robust regression, Real-time data***