

ARTIFICIAL NEURAL NETWORKS FOR INTERPRETING SPECTRAL EMISSIVITY VARIATIONS ACROSS COLD-ROLLED AHSS COILS

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ABSTRACT. Temperature excursions across advanced high-strength steel (AHSS) coils during intercritical annealing (ICA), part of the continuous galvanizing process, can lead to non-uniform and substandard mechanical properties, post-annealing, in turn causing high scrap rates in the industry. Variations in strip radiative properties can induce temperature excursions by influencing pyrometric temperature measurements and the rate of thermal absorption by the steel strip. In addition, processes upstream of annealing, such as hot-rolling, acid-pickling, and cold-rolling, can introduce non-uniformities in surface topography and hence radiative properties across a single coil. This study uses a data-driven artificial neural network (ANN) to analyze pre-annealed radiative property variations across cold-rolled AHSS coils. Such a system may be implemented on-line in conjunction with emerging strip imaging technologies for real-time spectral emissivity predictions before a coil section enters an ICA furnace.