

Modeling of Age Hardening Process Using Adaptive Neuro-Fuzzy Inference System: Results from Aluminum Alloy A356/Cow Horn Particulate Composite

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Abstract : This research reports on the modeling of age hardening process using adaptive neuro-fuzzy inference system (ANFIS). The age hardening output (Hardness) was predicted using ANFIS. The input parameters were ageing time, temperature and percentage composition of cow horn particles (CHp%). The results show the correlation coefficient (R) of the predicted hardness values versus the measured values was of 0.9985. Subsequently, values outside the experimental data points were predicted. When the temperature was kept constant, and other input parameters were varied, the average relative error of the predicted values was 0.0931%. When the temperature was varied, and other input parameters kept constant, the average relative error of the hardness values predictions was 80%. The results show that ANFIS with coarse experimental data points for learning is not very effective in predicting process outputs in the age hardening operation of A356 alloy/CHp particulate composite. The fine experimental data requirements by ANFIS make it more expensive in modeling and optimization of age hardening operations of A356 alloy/CHp particulate composite.

Keywords : adaptive neuro-fuzzy inference system (ANFIS), age hardening, aluminum alloy, metal matrix composite

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