The Use of Artificial Intelligence when Planning the Composition and Production of Wrought Aluminium Alloys with a Majority Share of Post-Consumed Scrap

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The demand for wrought aluminium alloys (WAAs) with a high proportion of post-consumed scrap (PCS) is steadily increasing due to their characteristic of sustainability. However, because of the differences in composition between primary aluminium and PCS, the design and production of these alloys dictate certain changes to the chemical composition and process parameters that derivate from those currently applied. Corrections are necessary if we want to ensure: (i) the set of properties prescribed by the customer, and (ii) maximise economic benefits.

In this research we wanted to answer the question of whether, by increasing the permissible concentration limits of selected alloying elements and optimizing the process parameters, we could achieve the target set of WAA properties with a high portion of PCS. We used artificial intelligence (IWM-IBM Watson Metallurgy) to design the alloy composition and the process parameters.

We experimented with selected alloys of the 6xxx and 2xxx series in such a way as to compare the predicted and actually achieved mechanical properties and formability. We found a very good match, which is a promising starting point for the further development of such alloys.