SYNTHESIS, STRUCTURE AND TENSILE PROPERTIES OF $AlMg_5Cr$ AND Al_5Si COMPONENTS PRODUCED BY WIRE-ARC ADDITIVE MANUFACTURING

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In recent years, the growing demand for efficient and high-precision manufacturing methods has led to the increased popularity of additive manufacturing processes. These methods are known as layer-by-layer techniques for the modification and manufacturing of components.
In this study, we present results of the evolution of the crystallographic structure, as well as the corresponding mechanical properties of wire arc additively manufactured (WAAM) AlMg5Cr and Al5Si specimens, studied by X-ray diffraction (XRD) and tensile testing, respectively.
The results show that the phase composition is in the form of a face-centred cubic (fcc) crystal structure in both cases, corresponding to the base material, as well as some traces of oxide phase Al_2O_3 for AlMg5Cr and pure Si for Al5Si components, respectively. The WAAM specimens growing are accompanied by a slight change in the preferred crystallographic orientation and a decrease in the imperfections concentration. Also, it was found that the ultimate tensile strength (UTS), yield strength (YS), and elongation slightly decrease from the initial to the more advanced stages of growth. Further investigations of the residual stresses and strains of wire-arc additively manufactured Al-based specimens are considered.
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