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A study on the production of molds for die casting through bimetal bonding in wire arc additive manufacturing

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The metal forming method using a mold can shorten production time and produce the same standard. However, molds for manufacturing large parts require large quantities of high-performance materials, making them expensive. Mold manufacturing through WAAM (Wire Arc Additive Manufacturing) can apply high-performance materials only to necessary areas by applying various metals. Therefore, it is possible to form a metal layer that is thicker and has higher bonding strength than the coating method. In this study, a die-casting mold was manufactured by applying dissimilar material joining through the WAAM method. The mold body was manufactured by layering using carbon steel, which is relatively inexpensive and has excellent thermal conductivity, and the cavity surface that directly contacts the molten metal was deposited with SUS316L, which has high heat resistance. Two industrial 6-axis robots were simultaneously controlled, and the joining of dissimilar metals was optimized according to the distance between torches. Shape data and microstructure were analyzed, and mold performance and manufacturing efficiency were improved.

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