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Research work title: Production of lightweight parts of magnesium alloys by lost foam casting method

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Abstract:

This project is about producing parts from magnesium alloys by lost-foam casting method, which combines the advantages of magnesium alloys, which have unique properties such as lightness and high specific strength, with the lost-foam casting method, which is used for producing complex and large parts. Lost-foam casting, which is an advanced and environmentally friendly technology, is used for producing complex parts that usually require cores. In this method, the casting steps are improved by eliminating the cores. Also, the sand used is reusable and the parts can be connected in clusters to a single gating system, which increases the production speed and economic efficiency. One of the reasons for the lack of development of the magnesium casting industry for producing parts used in various industries is the complexity of the magnesium casting process, low fluidity and high oxidation of the melt of these alloys, which causes limitations in producing magnesium parts, especially parts with complex and large shapes. By combining two technologies of lost-foam casting and magnesium alloys, the problems mentioned for producing large and complex magnesium parts can be eliminated, and the advantages of them can be utilized. In this project, by designing a specific casting plant and using argon gas instead of SF₆, not only the environmental protection is considered, but the pollution and the production costs are decreased. During the casting process, due to the costumed design of the mold chamber door, by creating negative pressure conditions along with the purification of the sucked air, the dust mixed with the gas in the vacuum application process is purified and at the same time the negative pressure stabilization occurs, which causes the mold filling and also the reduction of gas defects in the final part during the solidification process. Also, in the present project, very complex and large parts (300 grams to 250 kilograms) can be cast due to the ability to connect different parts of the model to each other and create a unified structure.

