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Design and application of novel hot work die steel with high strength, high toughness and high heat conduction coefficient

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The integrated die-casting technology significantly enhances the production efficiency of new energy vehicles while reducing costs, leading a revolution in the new energy vehicle industry. This technology places higher demands on the die steel materials used, and the availability of large-sized die steel is one of the bottlenecks encountered in the industrialization and application of this technology. Currently, the die steel used for integrated die-casting structural components of new energy vehicle bodies is not specifically developed for integrated die-casting technology. The large size of the dies causes difficulties in heat dissipation, and localized overheating can rapidly soften the die, leading to failure. Moreover, the challenges in heat dissipation severely affect the mechanical properties of the structural components. To address this issue, we used warm forging technology to improve the toughness of the high thermal conductivity die steel Fastcool50, which has already been successfully applied in the mold inserts at Tesla's Shanghai Gigafactory. At the same time, we systematically analyzed the mechanisms affecting the strength, toughness and thermal conductivity of hot work die steel. Meanwhile we are developing a new type hot work die steel, aiming to utilize traditional forging processes to produce large-sized hot work die steel materials that balance strength, toughness and thermal conductivity. This new die steel is expected to be applicable in fields such as aluminum alloy die-casting and hot forming.

Speaker Country

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