

Sustainable development of established steels for high-pressure die casting tools

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Aluminum die casting plays a major role in automotive construction and is becoming even more important due to new production technologies such as giga-casting. In the interests of climate-friendly production, however, the CO₂ footprint across the entire process chain must also be increasingly considered and approaches must be sought to minimize CO₂ emissions. Toolmaking must not be left out of this either. The production of tools based on a conventional process chain is usually carried out on a remelted, soft-annealed established 5% chromium steel with a vacuum hardening after mechanical pre-machining. Since this chain is both time-consuming and cost-intensive, several process owners are involved and CO₂ is emitted through the consumption of energy and overuse, considerations were made as to the extent to which production can be significantly shortened without reducing tool life. To this end, it is advisable to optimize established 5% chromium steels in terms of alloying and metallurgy in such a way that a pre-quenched and tempered bar represents the starting point for toolmaking. The report describes first tests with the comparative presentation of the mechanical-technological properties including the feasibility of high-speed machining. Based on the first experience, a second test was set up, which was again slightly changed in its chemical composition to achieve a hardness level of 44-46 HRC. This was used to evaluate an alternative production method for die-casting tools.

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