

Wear Mechanism of Hot Forging Die from the Viewpoint of Diffusion

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Abstract: The occurrence of plastic flow, the formation of the re-quenched zone and heat cracks, etc. have been considered as the reasons for the wear of hot forging die. Besides, the diffusion of the alloying elements within the die steel into works also can be considered to be one reason, because the work contacts the die surface under high pressure and flows over the die surface developing a new surface per each forging stroke and it is repeated many times. In this study, it is assumed that a depleted zone is formed on the die surface as a result of diffusion of alloying elements within the die into the work, the depleted zone breaks away at the critical thickness, and the break-away thickness is equal to the diffusion distances of elements. From these assumptions, the wear rates were calculated. The results of calculation show the remarkable dependence of the wear rate on the temperature on the die surface, and this coincides well with the existent experimental results.

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