The Use of Material-Technological Modelling to Determine the Effect of Temperature and Amount of Deformation on Microstructure Evolution in a Closed-Die Forging Treated by Controlled Cooling

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From the initial feedstock to the final product, the manufacture of forged parts is a highly complex process in which a large number of technological factors play their role. These factors are associated with temperature and the amount and rate of deformation. Developing a manufacturing route often involves major effort being put into finding optimum production parameters with respect to boundary conditions which mainly comprise customer requirements and financial aspects. In order to determine an optimum set-up for forging production or to introduce a new technology, a number of essential steps must be taken and sometimes repeated. In this context, material-technological modelling is a promising and effective tool which enables numerous optimization phases to be carried out in a laboratory environment without disrupting the operation of production lines in forge shops. The present paper describes material-technological modelling of production of a closed-die forged part of microalloyed steel involving the use of controlled cooling. The objective of this investigation was to define the processing window for microstructure evolution, depending on the forging temperature, the amount of deformation, and the rate of cooling from the finishing temperature.

Keywords: material-technological modelling, 30MnVS6, forging temperature, closed-die forging, microalloyed steel

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