

Simulating the process of vibroimpact cutting in precision investment casting

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The article deals with separating castings from the central gate channel, that is, the sprue, which is one of the most labour-intensive operations in precision investment casting. In practice, the vibroimpact method is considered the most promising way of carrying out this operation, not only increasing operation efficiency, but also decreasing time spent and material lost over the course of subsequent operations, and making it possible to exclude certain operations whatsoever. In order to coordinate cluster parameters and impact load characteristics that ensure optimum casting separation without any damage to the sprue, it is necessary to investigate and analyse impact dynamics in the cluster. We suggest simulating the cluster as a rigged rod with distributed parameters. We provide a mathematical description of the dynamics inside the cluster and establish how loads and stresses in the sprue cross-sections and runners connecting castings to the sprue depend on various factors. The patterns revealed provide sound reasons to select certain approaches to designing clusters and specifying impact load parameters.

Keywords: *precision casting, cluster, sprue, runners, castings, model, rigged rod, impact, stresses*

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