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Correlation between solidification parameters and machinability of an Al-10.0 wt.%Sn alloy solidified in a horizontal directional device

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The alloys of the Al-Sn system are widely applied in tribology because of their attractive characteristics for manufacturing components, which are subjected to an interaction between surfaces. They are typical in many mechanical systems that occur relative motion at metal-to-metal contact points, such as internal combustion engines, plain bearings, and mechanical systems. Thus, the analysis of machinability is a common condition that has a considerable impact on manufactured tribological components. Previous research established that the microstructure obtained during the solidification of the alloys plays an important role in machinability. For this reason, from an Al-10.0wt.%Sn alloy solidified in a horizontal directional device, it was related to how the thermal and microstructural parameters, such as the liquidus isotherm velocity (VL), cooling rate (TR), and the primary dendritic spacing influenced the machinability, namely: cutting temperature and tool wear. With this, it was found that the highest cutting temperature was reached at the position of 40 mm from the metal/mold interface. Besides, the heating rate showed a decreasing behavior as primary dentritic arm spacing increases, while flank tool wear decreases as primary dentritic arm spacing increases.