What happens at the interface between tool and workpiece with extremely expanded surface during cold forging

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Abstract

The upsetting-ball ironing test is revised by adding a ring die in upsetting to form the billet to a circular truncated cone to enhance the surface expansion ratio in ironing and make the ironing load sensitive to the frictional state. In the revised test, a divided flow and cracking take place at the surface layer of the billet during ironing and galling occurs conspicuously at the ending stage of ironing even for the zinc phosphate coating. It was confirmed that the anti-galling ability of dry in-place coating is significantly enhanced by the optimization of the tool surface roughness.

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