Scale effects in metal-forming friction and lubrication

Downscaling of metal-forming operations from macro-to microscale implies significant changes caused by size effects. Among these, the friction increases as reported by researchers using indirect test methods such as the ring-compression test and double-cup-extrusion test. In this study, a new test equipment is developed for studies of the size effect in metal-forming friction in the range from macro-to microscale. Investigations confirm a significant friction increase when downscaling. Visual inspection of the workpieces shows this to be explained by the amount of open and closed lubricant pockets.

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