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Effect of Preform Geometry and Molybdenum Addition on Work Hardening Behavior of Fe-0.8%C Steel Preforms during Cold Upsetting

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Abstract

One of the greatest benefit of powder metallurgy (P/M) is its ability to combine wide range of materials to formulate compositions for a chosen application. Among all the possibilities, only a few would lead to a best fit. Those possibilities must therefore be experimentally investigated before any use. In this paper, the Fe-0.8%C steel is considered due to its wide structural applications. The steel compositions is investigated for varying molybdenum content from 0 to 1.5% and for varying preform geometries such as 0.38 and 0.75 aspect ratios. The preforms are prepared by primary operations of P/M such as blending, compaction and sintering followed by secondary operation such as cold upsetting is exercised. The upsetting is executed using a mirror polished flat die set under graphite lubricant condition using 100 tons capacity hydraulic press in the incremental loading step of 2 tons until visible crack appeared on the hoop region of deforming preform. The results are used to reveal the work hardening characteristics of chosen composition under the influence of both compositions and preform geometries.

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Keywords: Fe-0.8%C steel; Preform geometry; Molybdenum addition; Work hardening; Cold upsetting

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