Open Forging of Cylindrical Blanks Subjected to Lateral Instability

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Abstract : The successful and efficient execution of a forging process is dependent upon the correct analysis of loading and metal flow of blanks. This paper investigates the Upper Bound Technique (UBT) and its application in the analysis of open forging process when a possibility of blank bulging exists. The UBT is one of the energy rate minimization methods for the solution of metal forming process based on the upper bound theorem. In this regards, the kinematically admissible velocity field is obtained by minimizing the total forging energy rate. A computer program is developed in this research to implement the UBT. The significant advantages of this method is the speed of execution while maintaining a fairly high degree of accuracy and the wide prediction capability. The information from this analysis is useful for the design of forging processes and dies. Results for the prediction of forging loads and stresses, metal flow and surface profiles with the assured benefits in terms of press selection and blank preform design are outlined in some detail. The obtained predictions are ready for comparison with both laboratory and industrial results.

Keywords : forging, upper bound technique, metal forming, forging energy, forging die/platen

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