

Determination of Friction Coefficients for the FE-Analysis of Sheet Forming of Tailored Welded Blanks

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Keywords: tribology, sheet metal, tailored blank

Abstract. The finite element analysis of sheet forming processes needs precise and reproducible data of the tribological conditions, which influence the material flow during the process. In this work the friction coefficient and its dependency on the hardness and surface topography of the blank are investigated. The selected materials are four steels with different surface qualities and coatings, FeP04, ZStE340, DP450 and TRIP800, which are joined by laser welding. Moreover, each material both with and without weld seam, was tested at three different values of normal contact pressure in a strip drawing test. The topography of both the base material and the weld line was obtained by measuring the surface roughness and implementing the data in a surface analysis software. Micro-hardness profiles along the tailored welded blanks were also determined. The strip drawing test was used to measure the friction coefficient between sheet metal and tool both in the case of tailored welded blanks and base material. The comparison between the results obtained for base materials and tailored welded blanks shows that the presence of the weld seam causes a clear increase of the friction between blank and tool.