Forming simulations are performed to predict the feasibility of sheet metal parts. The results of these forming simulation are as precise as the input data. For simulation results with high accuracy, a detailed material description, e.g. stress strain curve, yield locus and forming limit curve, is necessary. In this paper the determination of the yield locus of a mild steel DX56 under tension is investigated. In the state of the art the yield loci in the first quadrant of the stress space are determined by using a cruciform specimen and a biaxial tensile testing machine, which is electro-mechanically powered. For the experiments in this investigation a tool, which enables testing of specimen at defined stress ratios in the first quadrant of the stress space in a conventional uniaxial tensile testing machine is applied. This procedure allows the creation of interpolation points for the yield loci with lower costs compared to the biaxial tensile testing machine. Further, the start of plastic deformation is determined by two evaluation methods. First, a thermo-electrical effect is used and second the principle of equivalent plastic work is applied. The
resulting interpolation points of the yield locus were compared with points detected by tensile tests in 0° and 90° to rolling direction and hydraulic bulge test. Furthermore the influence of the different yield loci on the strain distribution of a forming simulation was investigated.

Stichworte:
Yield locus, biaxial tensile and compression test, link mechanism, thermo-electrical effect, cruciform specimen, biaxial tensile apparatus

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