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Experimental and Simulation Stress Strain Comparison of Hot Single Point Incremental Forming

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Abstract : Induction assisted single point incremental forming (IASPIF) is a flexible method and can be simply utilized to form a high strength alloys. Due to the interaction between the mechanical and thermal properties during IASPIF an evaluation for the process is necessary to be performed analytically. Therefore, a numerical simulation was carried out in this paper. The numerical analysis was operated at both room and elevated temperatures then compared with experimental results. Fully coupled dynamic temperature displacement explicit analysis was used to simulated the hot single point incremental forming. The numerical analysis was indicating that during hot single point incremental forming were a combination between complicated compression, tension and shear stresses. As a result, the equivalent plastic strain was increased excessively by rising both the formed part depth and the heating temperature during forming. Whereas, the forming forces were decreased from 5 kN at room temperature to 0.95 kN at elevated temperature. The simulation shows that the maximum true strain was occurred in the stretching zone which was the same as in experiment.

Keywords : induction heating, single point incremental forming, FE modeling, advanced high strength steel
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