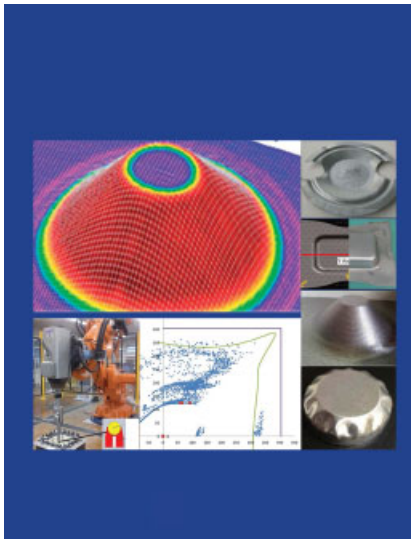

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The figures on the left shows incremental sheet forming operated by a robot together with experimentally measured strain contour and stress-based forming limit analysis. At the right the figures show four benchmarks study conducted in NUMISHEET2014 Conference: BM-1 Nonlinear Strain Path Forming Limit of a Reverse draw; BM-2: Springback of draw-redraw pan; BM-3 Incremental sheet forming; and BM-4: Wrinkling during redraw.

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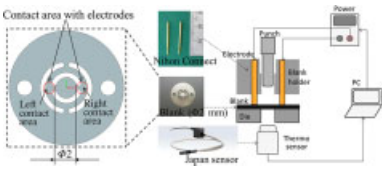
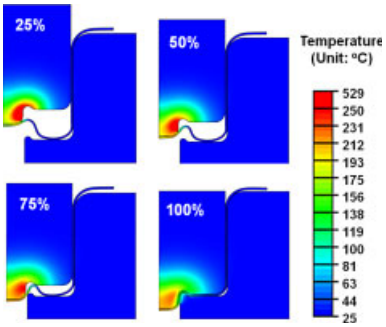
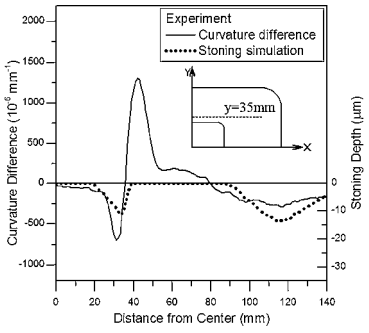


Finite element models for the numerical analysis of micro deep drawing process assisted by resistance heating are developed. Coupled thermal-electrical procedure and coupled thermal-displacement dynamic explicit procedure are conducted for the analysis of temperature distribution and material deformation, respectively. The process parameters are optimized to obtain uniform temperature distribution. The influence of temperature distribution on material deformation is discussed.



This study concerns warm forming of aluminum alloy sheets with the aid of high frequency induction heating. To validate the rapid and localized heating capability of induction heating, an electromagnetic-thermal coupled simulation is performed. A thermomechanical coupled analysis is then conducted to investigate the effect of the localized induction heating on the formability improvement of aluminum alloys.



This work proposes a new robust prediction method that uses stoning simulation and curvature analysis sequentially. First, for reliable detection of surface deflection, stoning simulation was utilized. Next, for the accurate quantification, curvature analysis with adaptive span was applied. In a shallow rectangular drawing with inner rectangular embossing, the reliable detection and the accurate quantification of surface deflection is demonstrated.

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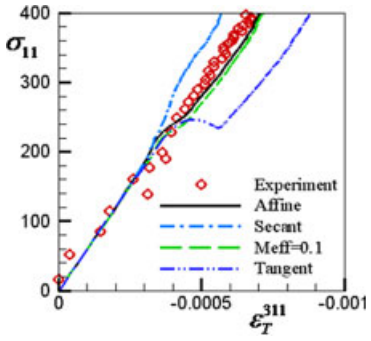
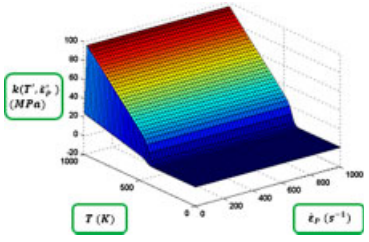
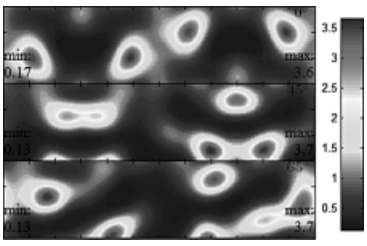


The recently developed large strain elastic visco-plastic self-consistent (EVPSC) model, with various popular self-consistent schemes, is used to study the lattice strain evolution in a stainless steel under uniaxial tension. It is found that, among the self-consistent schemes examined, the Affine and Meff self-consistent schemes give the best results.



In this study, viscoplastic hardening behavior of aluminum alloy 3003 sheet is measured and modeled. Three different hardening models are utilized to fit experimental stress–strain data. Evaluation on each model for flow stress prediction convinces that the modified Hollomon/Voce law with additional k (T′, ε_p^*)function improves prediction accuracy.

The figure shows the simulated wrinkling profiles for AA5042 with NUMISHEET2014 Benchmark Test. A total of 13 wrinkles are generated consistently for both experiment and simulation. Finite element model contains 57 721 nodes and 57 540 four-node BWC shell elements based on an explicit time integration method. Barlat's Yld2000-2d material model is employed with isotropic hardening.



The mechanical behaviour of AA5182 produced by conventional rolling (CR), asymmetric rolling-continuous (ASRC) and asymmetric rolling-reversed (ASRR) is investigated and modeled with a rate dependent crystal plasticity finite element method and VPSC model. The strain-based and stress-based formability is predicted by M-K theory combined with Yld2000 model. The new ASRR process preserves the formability and improves strength relatively to CR.

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