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Characterization of the longitudinal bow during flexible roll forming of steel sheets

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Abstract

Flexible roll forming is an advanced sheet metal forming process that allows for the production of variable cross-section profiles. Longitudinal bow is one of the major shape defects found in roll-formed products. To characterize the degree of longitudinal bow during flexible roll forming, experiments were conducted on three different blank shapes: trapezoid, convex and concave. Symmetric U-sections with variable cross-sections were roll formed using the three sheet materials with different strengths from each blank shape. The effects of process variables on the longitudinal strain and longitudinal bow were analyzed both experimentally and by using finite element simulations based on ABAQUS-Implicit 6.14. The results show that the transversal nonuniformity of the longitudinal strain is one of the fundamental causes of longitudinal bow in roll-formed products. The bow height as a function of blank shape increases

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