

A Modified Swift Law for High-Strength Steels

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Abstract. For most materials the tensile curve can be fitted with one of the usual constitutive laws: pure plasticity, linear hardening, Hollomon, Nadai, Swift or Ludwik. However, high-strength steels, due to a specific hardening behavior, cannot be accurately characterized with one of the above-mentioned laws. The same is true for the unit bending moment that is often used to characterize materials under bending conditions. An additional problem of high-strength steels is that tensile tests can be performed up to maximum strains ranging from 3 to about 5%, while in the bending process the typical values of stable strains (without visible damage) can be up to 20% and sometimes even higher. In order to overcome these difficulties, an appropriate material model has been developed for high-strength steels that allows to accurately represent the forming behavior over the entire relevant strain range.