

Advanced High Strength Sheet Steels for Automotive Applications: Microstructures, Properties and Formability

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In recent years there has been an increased emphasis on the development of new advanced high strength sheet steels (AHSS), particularly for automotive applications driven by needs for vehicle weight reduction to improve fuel economy and materials which lead to enhanced crash performance and passenger safety. Steels of current interest involve novel alloying and processing combinations to produce unique microstructural combinations and have been referred to by a variety of identifiers including, among others, DP (dual phase), TRIP (transformation induced plasticity), HSLA (high strength low alloy), CP (complex phase), TWIP (twinning induced plasticity), and martensitic steels. The properties of these multi-phase steels are derived from appropriate combinations of strengthening mechanisms, the basics of which have been well developed in the steel literature. Continued developments of AHSS steels, designed for specific applications, will require careful microstructure control to optimize the specific strengthening mechanisms responsible for the desirable final properties. In this presentation, recent AHSS developments are examined, and approaches to produce high strength sheet steels with unique strength/ductility combinations are discussed.