9946 Properties of Galvanized and Galvannealed Advanced High Strength Hot Rolled Steels

Benefits

- Reduction of cold rolling process for hot strip mill products.
- Improved coating quality.
- Elimination of scrap associated with cold rolling.

Applications

Advanced high strength hot rolled automotive sheet steels.

Energy

Energy savings of 231 billion Btu per year could be obtained by converting 3,470,000 tons of cold rolled GI sheet to hot rolled product.

Environmental

Greenhouse gas emissions could be reduced by an estimated 47,355 tons/yr CO 2 , 88 tons/yr NO X and 65 tons/yr SO 2.

Additional GHG reductions through improved fuel economy in vehicles: every 10% reduction in weight results in a similar % improvement in fuel economy.

Recent advances in hot rolling technology have made possible the production of hot rolled products with more consistent gauge, shape, profile and surface quality. These improved hot rolled products are suitable for galvanizing after pickling and therefore, finished galvanized strip can be produced without a cold reduction step, resulting in significant energy and cost savings. New high strength hot rolled grades have been developed based on precipitation (HSLA), Dual Phase (DP) and Transformation Induced Plasticity (TRIP) strengthening mechanisms.

Thermomechanical processing routes exist to produce these grades as 1 to 3 mm hot rolled strip that can achieve target yield strengths of 350-600 MPa (50-85 ksi). The improved strength-formability combinations of these grades over those obtained for conventional steels can yield significant performance advantages such as improved crashworthiness and weight reduction. Consequently, these grades are of great interest to the auto-motive industry for fabrication of front structure components such as rocker panel, engine cradle and hydroformed engine compartment frames. Corrosion resistance of these parts can be provided at low cost by hot dip galvanizing. Some grades may also be suitable for closure applications, in which case a galvannealed zinc coating is required to meet customer's expectations of a high quality painted finish.

Project Goal: To develop the required coating process information, formability and user property data for implementation of galvanized and galvanneal high strength hot rolled steel in industrial application such as automotive.

The technical hurdles to overcome in such applications are (1) achievement of good quality coatings while retaining target mechanical properties, (2) lack of precise knowledge of the behavior of these steels in the various forming operations and (3) development of accurate user property data in the galvannealed conditions.

Progress and Milestones

- ❖ Project start date: June 2005
- ❖ Galvanizing simulator trials: June 2006
- ❖ Formability evaluation: December 2006
- ❖ Fatigue & dynamic tensile strength evaluation: April 2007
- ❖ Project completion date: June 2007

Total Project Cost $288,973

Duration 2 years

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