PAPER ID:150

INFLUENCE OF METALLURGICAL PARAMETERS ON THE APPEARANCE OF GALVANIZED HOT ROLLED STEEL

Amit Kumar Kundu*, Prabhash Gokarn

Scientific Services, Tata Steel, Kalinganagar

* Corresponding author

ABSTRACT

Background

Galvanizing is often used for protecting steel from corrosion by coating it with zinc or zinc alloys, Hot rolled steel is subjected to continuous hot-dip galvanizing, in which the steel is submerged in a bath of molten hot zinc online; with parameters like time the steel is submerged, bath temperature and speed of air blowing post removal controlled to get a uniform finish. These parameters are usually fixed based on the grade of steel being rolled and its thickness. The final appearance of the galvanized product is important, with a dull finish preferred because of its ease in painting subsequently, post processing at the customer's end. For some applications, - specially where the article is left unpainted, customers prefer a brighter appearance.

Objective

It was found that in the same steel grade, with the same parameters maintained during continuous hot dip galvanizing, showed both, the desired dull grey appearance along with a bright appearance which is not preferred by our customers due to problems in subsequent processing. It thus became is necessary to find the reason for the difference in appearance.

Methodology

All parameters for steel coils with bright and dull appearance were studied in multiple instances of getting bright and dull appearance. The data so collected was analysed. Extensive literature survey was done before arriving at the root cause for the difference in the appearance.

Key Result

We studied the possible influence of chemistry and other metallurgical factors on the appearance of the steel. It was found that a higher percentage of the zeta (ζ) layer on the surface caused a dull appearance. This is due to increased thickness of coating across the defect location caused by a higher amount of Silicon in the steel. This is due to the Sandelin effect, which results in the formation of a higher-thickness coating and a modification of the structure of the Zn – Fe layer. A modification of the composition and temperature of the zinc bath, modification of the speed of withdrawal, modification of the pre-treatment given to the surface, etc. are possible solutions to getting a uniform coating appearance.

Keywords: Galvanizing, Coating Appearance, Zeta Layer, Sandelin Effect