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Defects analysis for bright spots on surface of electro-zinc coated sheet

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ABSTRACT

The painting effect of products would be affected if the bright spots happen on the surface of electro-zinc coated sheet. The defects of bright spots are researched by macroscopical observation, scanning electronic microscope, X-ray energy spectrometer, metallography microscope and the electron back-scatter diffraction (EBSD). The result shows that the defects of bright spots are inherited by mixed-grains on the surface of primary steel sheet. It could be solved by controlling the annealing temperature of cold-rolled steel sheets, increasing the rolling reduction or strain rate when the sheets are rolled and uniform heat treatment to the original austenite grains in the continuous metal casting blank.

Electro-zinc coated steel sheets are widely used in automobile and apparatus industry. The appearance is more instruct besides its mechanical and corrosion resistant property. Some tiny defects would affect the painting effect of products. Once the bright spot defects were found on the surface of electro-zinc coated steel sheet in some steel works and the appearance of electro-zinc coated steel sheets become bad. In order to finding how the bright spots happened and how to eliminate the defects in the end, rounded analysis is made by some inspections.

1. Macroscopic observation

Fig. 1 shows the macroscopic appearance of bright spots, which are evenly distributed and appear as short strips. The breadth is less than 1 mm and their length is less than 5 mm. The bright spots are silvery white but normal area of primary steel sheet is light gray.

2. Scanning electronic microscope and energy spectrometer analysis

Bright spots are marked in order to find the defects position precisely. Microscopic analysis is achieved by scanning electronic microscope together with energy spectrometer. Fig. 2 shows the microscopic appearance of bright spots which is magnified in 500 magnification. Fig. 3 shows microscopic appearance of normal area with the same magnification.

The same magnification is chosen in order to comparing expediently. It can be found from Figs. 2 and 3 that the surface of coating is made of many grains of zinc. No obvious difference can be seen only by backscattered electron images, but the grain size is larger in bright spots area than in normal area. Quantitative analysis by energy spectrometer shows that the

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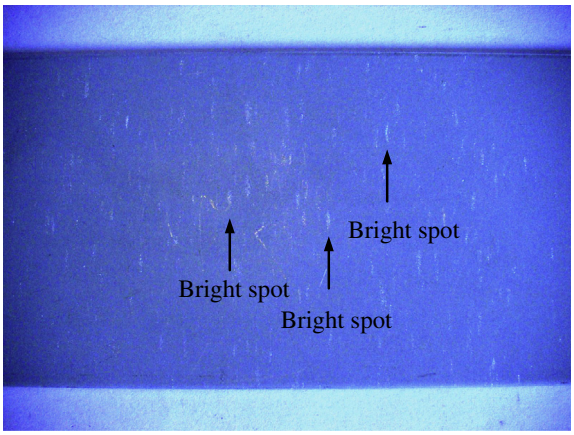

Fig. 1. Macroscopic appearance of bright spots.

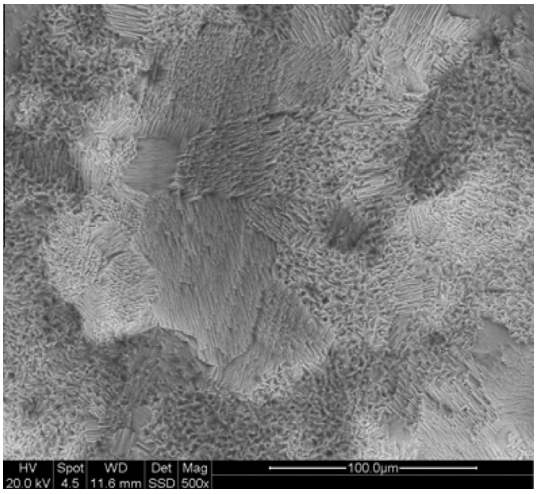

Fig. 2. Microscopic appearance of bright spot.

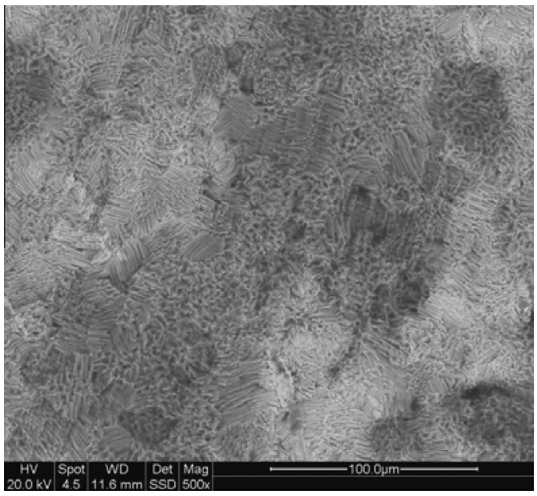

Fig. 3. Microscopic appearance of normal area.