



1. Introduction

In the production process of hot-dip zinc-coated steel sheets, the “yudare” defect (also called wrinkle-like defect), which is wavy-shaped unevenness of the steel sheet surface, occurs due to unevenness in the thickness of the zinc coating. In this work, a method for quantitatively evaluating the degree of the yudare was developed, as introduced in this article.

2. Introduction of Technology

2.1 Background

In the hot-dip zinc-coated steel sheet production process, steel strips pass through a pot containing molten zinc, and the molten zinc that adheres to the strip is adjusted to a uniform thickness by wiping the strip surface. In some cases, however, the defect called yudare

with an interval of a few mm to a few 10mm exists in the plane direction. The height of the unevenness is on the order of a few μm .

2.3 Concept of Quantification

The concept of quantification of the yudare defect will be explained in the following.

In calculating surface quality parameters, the result of extraction of the high-frequency components (for example, period $\lambda < 0.8$ mm) from a certain primary profile is called the roughness profile, and the result of extraction of the low-frequency components (for example, period $\lambda \geq 0.8$ mm) is called the waviness profile. Arithmetic mean roughness R_a is the mean value of the absolute value of the height of the roughness profile

Although, as mentioned previously, the yudare defect can be seen as unevenness with a spacing of a few mm or more in the plane direction, a comparison of the waviness profiles of light yudare and heavy yudare revealed that the spacing is different in the two types. **Figure 3** shows the waviness profiles of the parts shown by the broken lines in Fig. 2. In the case of heavy yudare, there is no difference in height, but it can

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Fig. 1 Mechanism of 'yudare' defects deformation



Fig. 2 Height maps of 'yudare' defects (left: no defects, center: light yudare, right: heavy yudare)

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