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Effect of Different Annealing Temperatures on Friction Characteristic and Formation of Coatings in Galvannealed sheet steels

Jung Min Lee*, Sung Jin Jun*, Dong Hwan Kim** and Byung Min Kim#,

ABSTRACT

This paper is designed to estimate friction and powdering characteristic of coating layer on galvannealed sheet steel with different annealing temperature, which is 465, 505, 515 and 540 . Estimations of powdering and friction were done using a 60 ° bending test and one side friction test, respectively. In order to obviously understand the effect of coatings on friction cross-section of coatings before and after friction test was also observed by SEM. The results show that powdering of coatings is increased with increasing of annealing temperature and that friction characteristic greatly depends on powdering which leads to increase of real contact area between tools and coatings.

Key Words : Galvannealed sheet steel(), Powdering(), Annealing temperature(), One side friction test()

1.

가
10
(Powdering) 가 6~7 μm , (Ra: μm)
가 가
GA 2.2 60 °
4 가 60 ° (Tapping)
가 SEM . Fig. 1
Fig. 2

2.

2.1 가 (CrN)
(Polishing) (Ra) 0.6
가 465, 505, 515, Table 1
540 (465, 505, 515, 540) 4

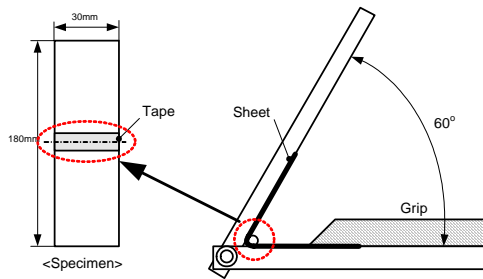


Fig. 1 Schematic drawing of 60 ° bending test

2.3

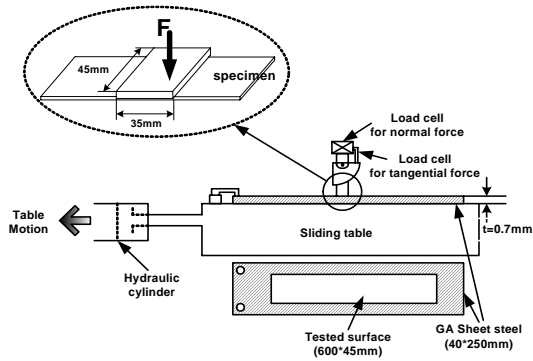


Fig. 2 Schematic drawing of one side friction tester and dimensions of tool and specimens

Table 1 Conditions of on side friction test

Items	Specifics	
Tool	STD11(CrN coating)	
Drawing speed	30mm/s	
Normal pressure	2 and 4 MPa	
Lubricant	Washing oil (P-340N)	Rust prevent oil (BW-90EG)
	2.9cst, 40	18.6cst

3.

3.1 60 °

Fig. 3

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4MPa 540 가 가
가 가
1-5

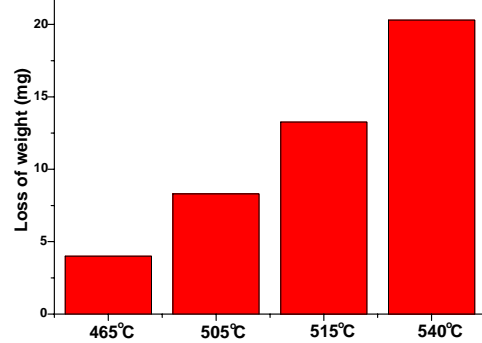
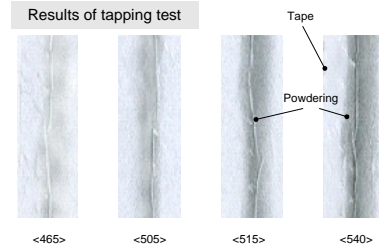


Fig. 3 Effect of annealing temperature on amount of powdering

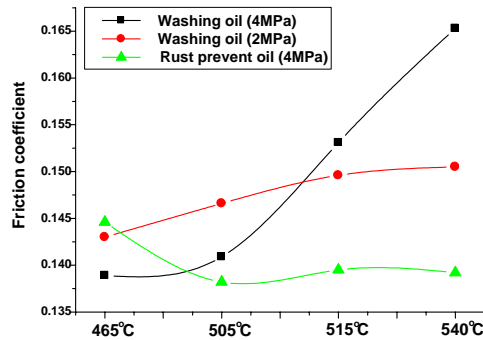


Fig. 4 Effect of normal pressure and lubricants on friction coefficient of coatings

Fig. 4

505, 515, 540

, 465

, 40MPa

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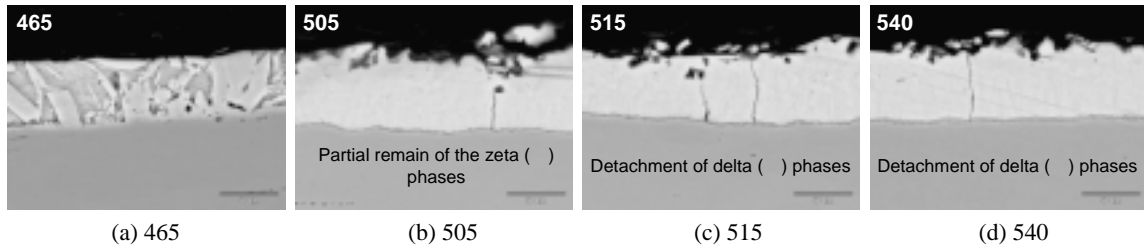


Fig. 5 SEM images of cross-sections of coatings with different annealing temperatures after friction test at 2MPa, normal pressure and washing oil

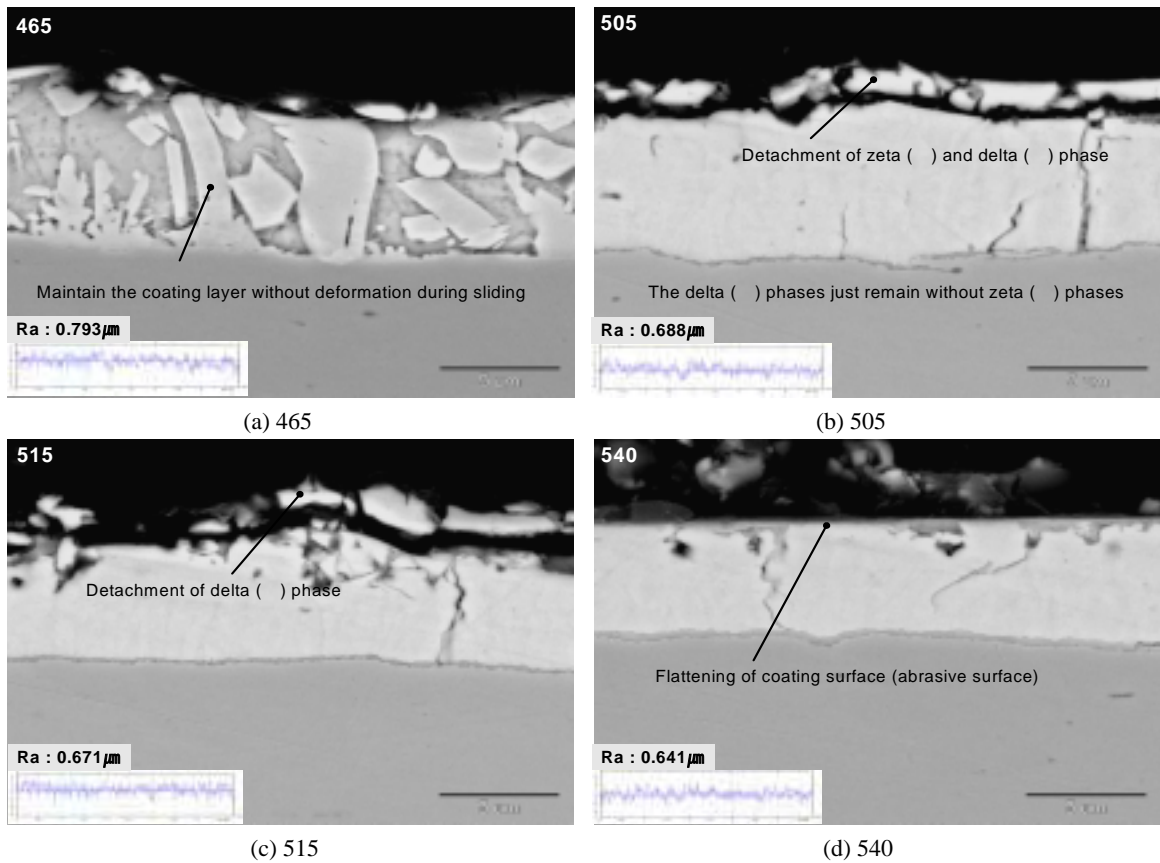


Fig. 6 SEM images of cross-sections of coatings with different annealing temperatures after friction test at 4MPa, normal pressure and washing oil

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