

Development of a Composition Brake Shoe for Reducing Damage to the Wheel Tread

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1. Introduction

In rail vehicles that use composition brake shoes acting on the wheel tread, the friction coefficient between the wheel and the brake shoe tends to decrease under wet conditions, and the brake force reduces. Although a metallic block has previously been inserted to counteract the reduction in friction coefficient under such wet conditions, this metallic block rubs excessively on the wheel tread under dry conditions, and causes a localized increase in the temperature of the wheel tread. Such heat load is one of the factors that produce the wheel tread damage referred to as "heat crack and concave wear".

2. Outline

We studied composition brake shoes from a structural point of view and developed a shoe that does not use metallic blocks to restrict increases in the temperature of the wheel tread but maintains brake performance under wet conditions. We have evaluated the performance of the developed composition brake shoe (Fig. 1) in dynamo tests, running tests and long-term running tests. As described below, tests have verified that the developed brake shoe will control concave wear and it will produce a longer wheel life span while maintaining good brake performance.

3. Test results

A brake performance running test was carried out using the developed shoe. The test train set consisted of two vehicles. The developed shoe was able to maintain the brake distance under wet conditions (Fig. 2) and reduce the damage to the wheel due to a reduction in heat load. A long-term durability running test was carried out using the developed shoe in service. A comparison of estimated wheel shapes (after 80000 km running) is shown in Fig. 3. The wear shape of the wheel with the conventional shoe shows some concave wear with the concavity covering the slide width of the shoe. In contrast, the developed shoe

certainly has an inhibiting effect on wheel concave wear. A comparison of wheel life span is shown in Fig. 4. The life of the wheel with developed brake shoe is as much as 1.8 times the life of the conventional shoe. Additionally, maintenance costs with the developed shoe will be reduced as wheels will need to be replaced less frequently.

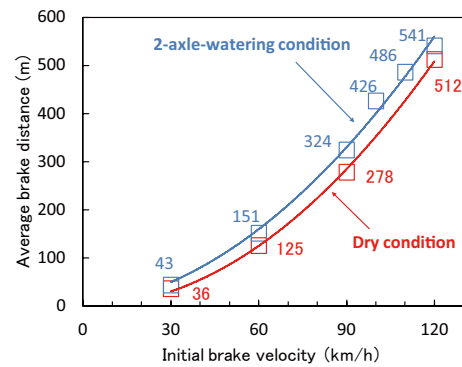


Fig. 2 Results of brake distance

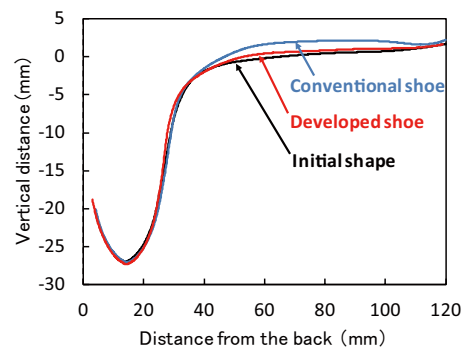


Fig. 3 Estimated shape at 80000 km

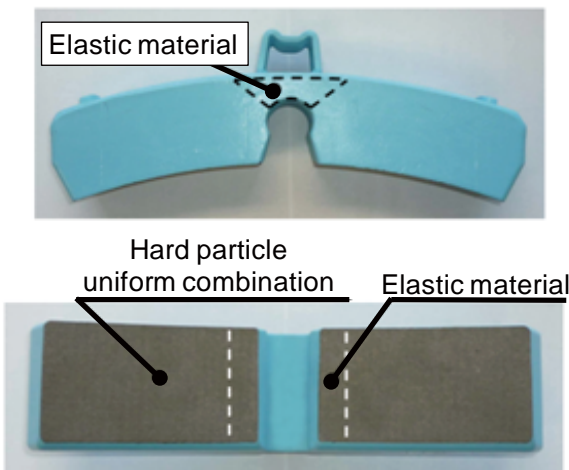


Fig. 1 Developed composition brake shoe

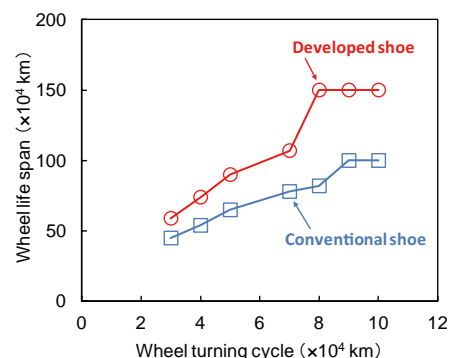


Fig. 4 Estimated wheel life span