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Present Paper at SAE 2017 Brake Colloquium & Exhibition

We presented a paper at SAE 2017 Brake Colloquium & Exhibition on September 26, 2017. This paper will be published in SAE International's scholarly journal.
At this Brake Colloquium, 2016 Best Paper Award was presented to Toshikazu OKAMURA, Chief Engineer, who participated in “Rotor Specification and Quality Panel” as well.

1. TITLE

Study of Difference in Friction Behavior of Brake Disc Rotor with Various Surface Textures during Running-in by Using Simple Model

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2. AUTHOR

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3. ABSTRACT

The most fundamental function of an automobile brake system is assuring stable braking effectiveness under various conditions. In a previous paper (2004-01-2765), the author et al. confirmed that the friction behavior of disc brakes during running-in depends on both the friction materials and discs’ friction-surface textures. Various friction pairs were tested by combining discs finished with roller-burnishing and grinding and five friction materials including NAO and low-steel. Some NAO material exhibited large effects on the difference in friction behaviors between the discs’ surface textures. A disc finished with roller-burnishing needed a longer running-in period than that with grinding. In another paper (2011-01-2382), a further experiment was conducted by combining eight surface textures (finished under four turning conditions with and without additional roller-burnishing), two NAO materials, and two rotational directions. Notable phenomena were observed, e.g., the coefficients of friction had a peak at the early stage of testing and there was a difference in those at the final stage between surface textures. These behaviors were determined to be due to the contribution of aggressiveness and adhesiveness to friction by comparing the coefficients of friction and discs’ surface textures and wear. Friction behaviors at the early stage of use have become more significant since the running-in period has been extended due to the application of large discs for better braking performance and the increase in the number of hybrid and electric vehicles equipped with regenerative braking. In this study, therefore, simplified linear (2D) and areal (3D) roughness models with various surface textures were introduced, and their behaviors of wear and roughness were numerically simulated. The change in discs’ surface textures along with increasing wear depended on their initial textures. These models and simulation confirmed the effects of surface textures on friction during running-in, which were experimentally observed in the previous studies.

5. CONTACT

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