News Release

Railway Technical Research Institute

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Integrated Tread Surface Conditioning Block to Reduce Wheel-Flange Wear Developed

The Railway Technical Research Institute developed dual-function integrated tread surface conditioning block to keep proper wheel surface conditions by enhancing rail-wheel adhesion* while reducing reduce flange wear.

* Adhesion: Friction between wheel and rail. Trains can be accelerated or decelerated by this adhesive force.

【Background of development】

Train wheels have two areas, tread to keep rolling with rail head constantly {(A) in Fig. 1} and flange to prevent derailment on curves. {(B) in Fig. 1} Wheel tread needs to have proper roughness to prevent skidding and sliding (adhesion). Meanwhile the flange is required to have lower frictional coefficient in order to reduce rail and wheel wear (lubricity), as it contacts with rail while the train is running on curves.

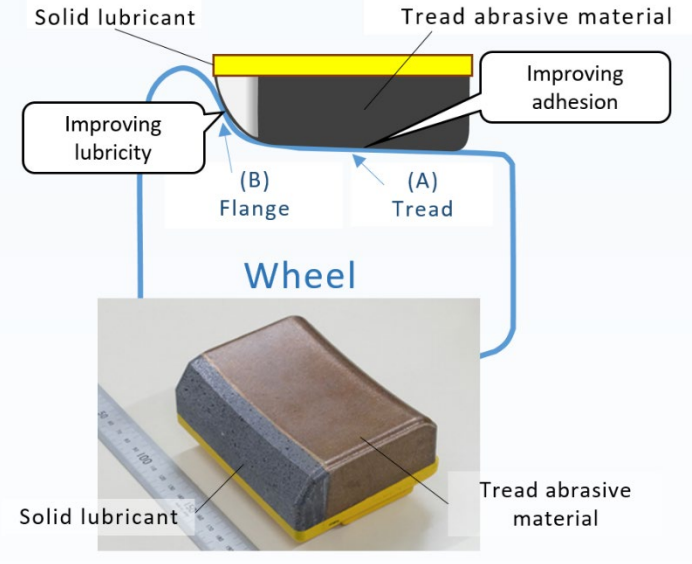

Figure 1: Integrated tread surface conditioning block

Currently, two separate devices, tread abrasive (① in Fig. 2) and flange lubricators are used to improve two different properties of wheels, adhesion of tread and lubricity of the flange. (② in Fig.2). Instead of using two devices, RTRI's team led by the Frictional Materials Laboratory has developed the integrated tread surface conditioning block capable of improving both properties as a single device (Fig.1)

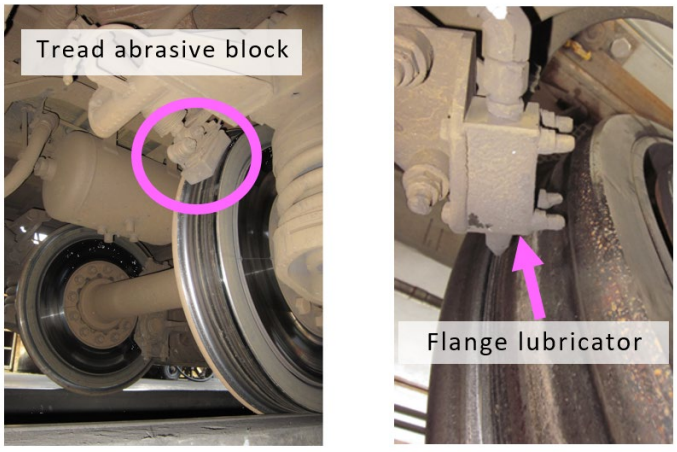

Figure 2: Current tread abrasive and flange lubricators

【Characteristics of the integrated tread surface conditioning block】

RTRI has developed the solid lubricant with the same base material, thermosetting resin, as current abrasive block in order to integrate solid lubricant and abrasive block into one device. The lubricity of the integrated conditioning block is mainly attributed to MoS2. The properties of the developed block are as follows:

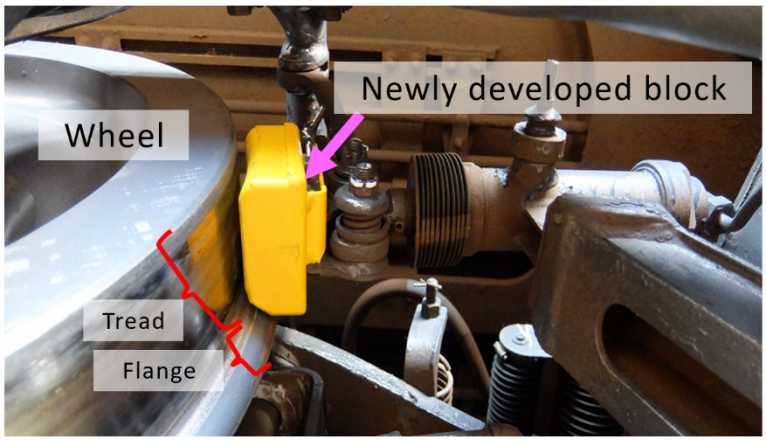

Figure 3: Newly developed block mounted on a truck

- The block can increase both lubricity of the flange and adhesion of the wheel tread at one time.
- Since the fittings of the developed block has the same dimension and structure as that of the current abrasive block, they are interchangeable.
- Since the block has almost the same durability for wear as does the current abrasive block, the replacement period will remain unchanged. In addition, the current flange lubricator will not be necessary any more.
- The joint surface between the solid lubricant and abrasive material could be a weak spot in terms of durability. But it meets the standard value of impact strength for tread abrasive block (2.0kJ/m^2).

【Advantages of the integrated tread surface conditioning block】

The developed block was mounted to an express tilting train whose wheel flange tends to wear rather rapidly and running tests were conducted in order to confirm its lubricity and effect on adhesion. The current abrasive block and the newly-developed block were mounted to the same type of trains and the flange wear rates (amount of flange wear per 10,000 km of running distance) were compared. The wear rate of the vehicle with the newly-developed block is 45% lower than that of the vehicle with current abrasive block (without flange lubricator) and the lubricating

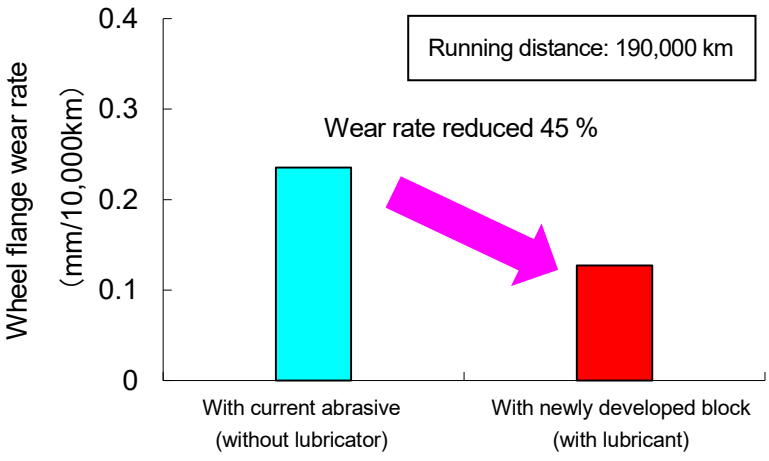

Figure 4: Reduced flange wear rate by the developed block

performance of the block was confirmed. (Fig.4) If train wheels skid during running due to lowered wheel/rail adhesion, wheel damage called “flat” is likely to occur. Since the wheel flat was not found on the wheels of the block-mounted test vehicle after the test running, it is also confirmed that the developed block has the same level of performance to keep adhesion as that of the current device.

It is expected that vehicle and rail maintenance work will be reduced by mounting this block to vehicles. This product has already been mounted to some of commercial-service vehicles (Series 883 and 885 of the Kyushu Railway Company) for the test purpose.

【Patent filing】

RTRI has filed patent applications on part of the technologies used for the block jointly with Ueda Brake K.K.