**News Release**
Railway Technical Research Institute
No. 201605
July 21, 2016

# RTRI Develops a New-Type Bogie for Reducing the Risk of Derailment

**RTRI developed a new-type bogie in order to enhance the running safety of conventional line trains. The newly-developed bogie is equipped with a mechanism to prevent wheel load loss and to reduce lateral force, and is currently undergoing running tests to confirm its performance and durability at the MIHARA Test Center of Mitsubishi Heavy Industries, Ltd., toward commercial application.**

A flange-climbing derailment, one of the derailment phenomena for a railway vehicle, is likely to occur when the lateral force against rail extremely increases and, at the same time, the wheel load, a force pressing wheels downward onto rail, decreases. As an indicator to assess the safety against the flange-climbing derailment, the quotient of lateral force divided by wheel load, what we call “derailment coefficient,” has been used. Since 2011, RTRI has been working for the development of the new bogie in order to get rid of flange-climbing derailments.

This newly-developed bogie has a mechanism to rotate side beams of a bogie around a cross beam. With this mechanism, not only the wheels but the entire bogie frame can negotiate the horizontal torsion of rails and prevent loss of wheel load (Figure 1). Moreover, its axles can be steered by an actuator on curves and reduce the lateral force by reducing the attack angle of wheels against rail (Fig.2: Steering assistance mechanism).

Since May 2016, at the test track of the MIHARA Test Center of Mitsubishi Heavy Industries, Ltd., we have been conducting running tests of a test vehicle equipped with the new-type bogie in order to confirm its performance and durability. As the result of these tests, it has been confirmed that the rate of wheel load loss for this bogie is roughly 30 % smaller than that on ordinary types of bogies (Fig.3). We have also confirmed that, if the steering assistance function works, the lateral force is reduced to 1/2 or 1/3 on 120 m-radius curves (Fig. 4). As the result, it has been confirmed that the average derailment coefficient of this bogie is approximately half the value of the bogies with ordinary structures, which means the safety against flange-climbing derailment has been greatly improved (Fig.5). The targeted running distance of the durability tests prior to commercial operation is 5,000 km and the tests will be completed on July 27, this year.

Part of this project has been implemented with the grant for railway technical development provided by Japan’s Ministry of Land, Infrastructure, Transport and Tourism.

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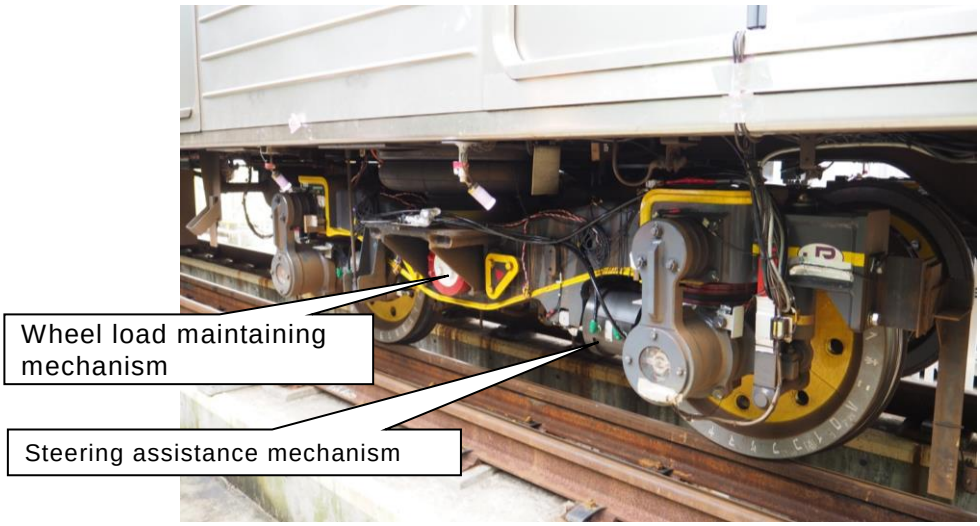


Photo 1 Derailment-resistant Bogie

Photo 2 Test vehicle equipped with derailment-resistant bogie

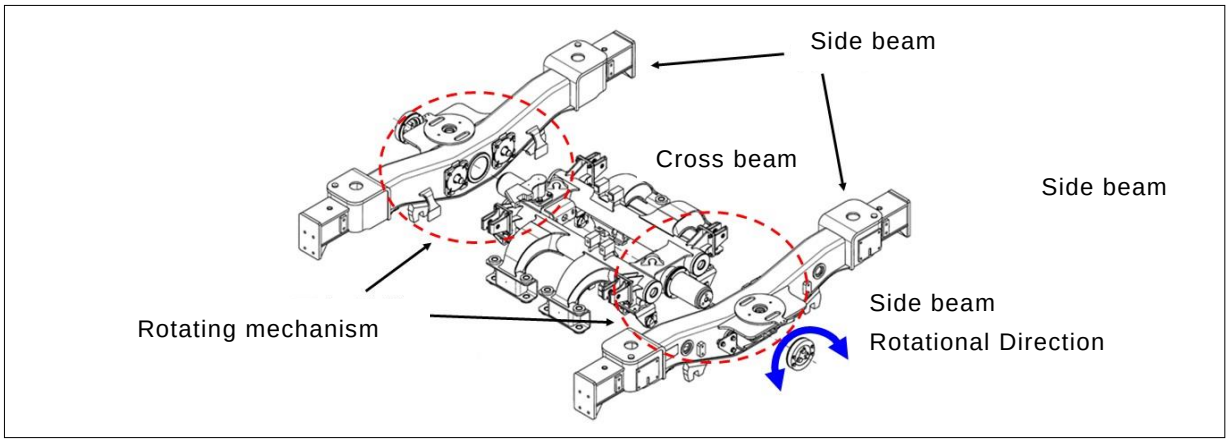


Figure 1 Mechanism of controlling decrement of wheel load

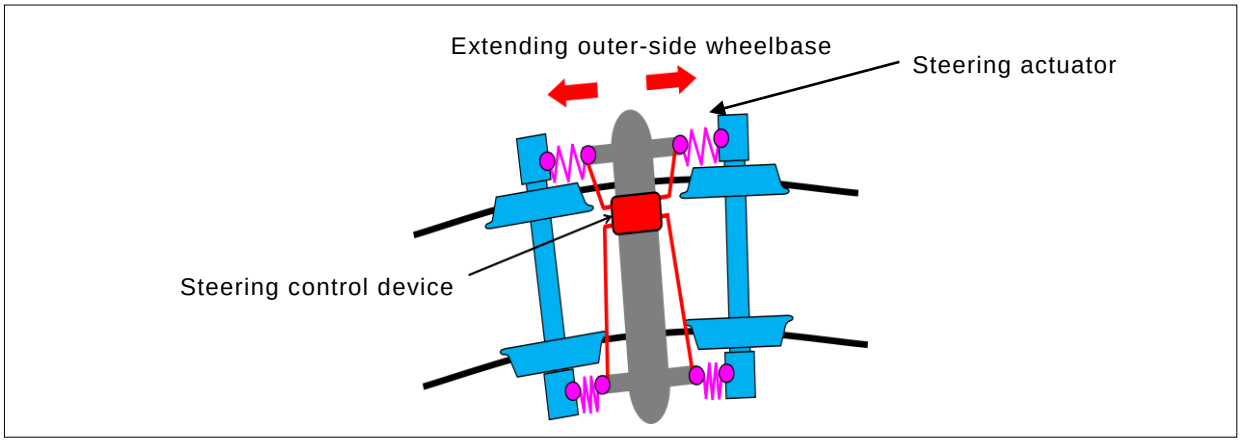


Figure 2 Assist steering system

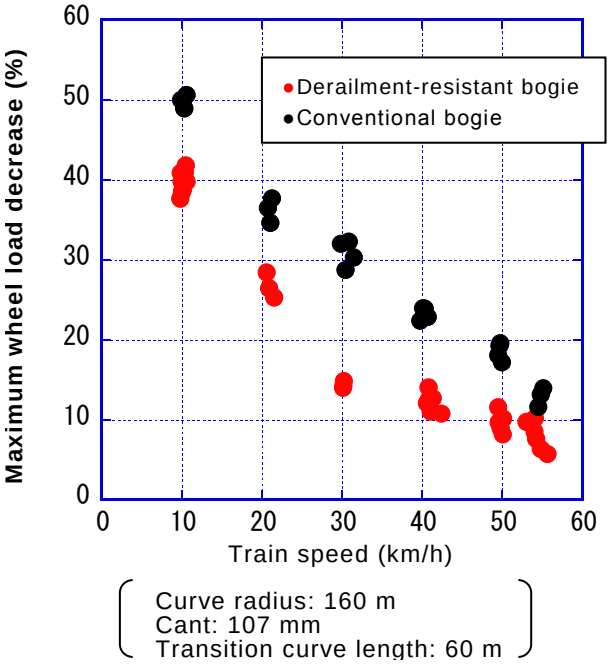


Figure 3: Wheel load maintaining effect on a transition curve

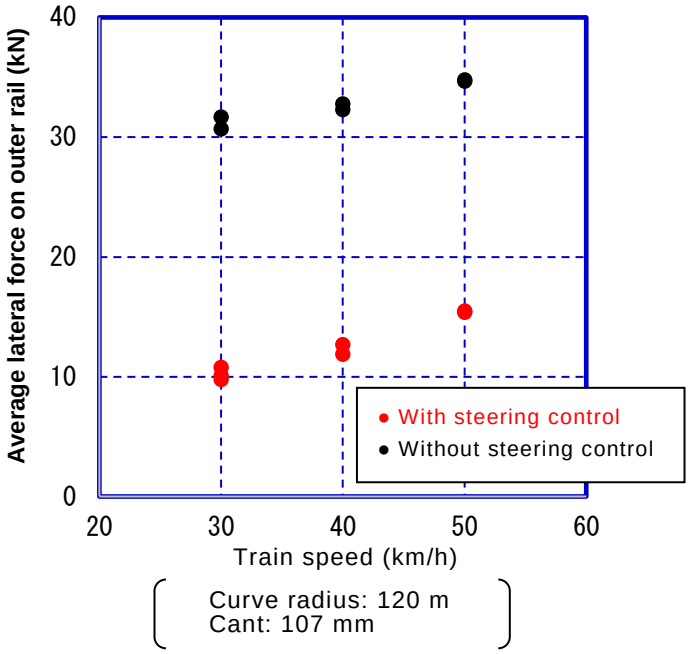


Figure 4: Lateral force reducing effect on a circular curve

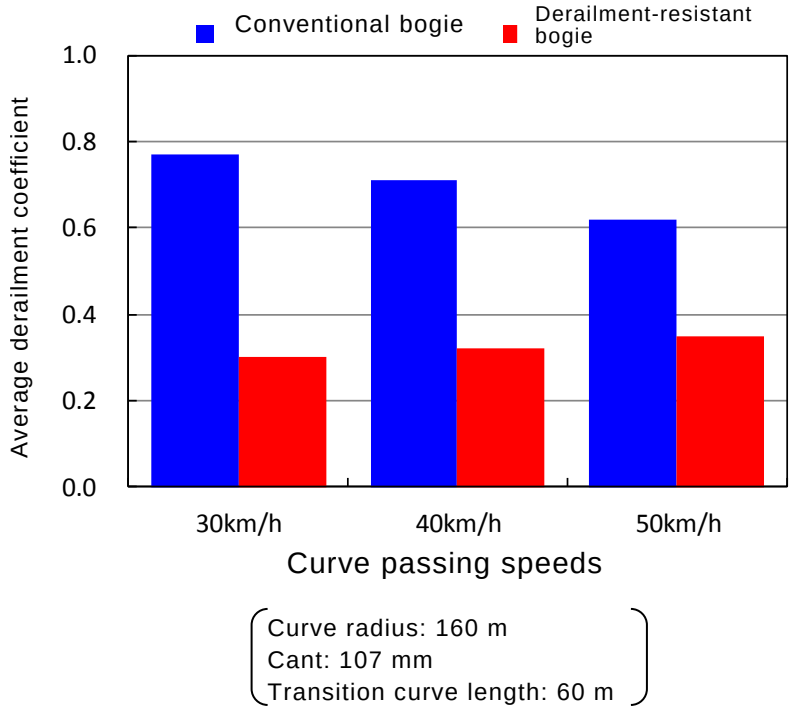


Figure 5: Average derailment coefficient when passing curves at MIHARA Test Center