

Railway accident investigation report

Railway operator: Yurikamome Inc.
Accident type: Train derailment.
Date and time: About 17:05, on April 14, 2006.
Location: In the premises of Fune-no-kagakukan station, Tokyo Waterfront New Transit-Waterfront Line, Koto-Ku, Tokyo Metropolitan.

SUMMARY

The No. 1612 train, composed of 6 vehicle and operated automatically without boarded train crew, starting from Toyosu station bound for Shimbashi station, Tokyo Waterfront New Transit-Waterfront Line of Yurikamome Inc., departed Telecom Center station on schedule, i.e., 17:00, Friday, April 14, 2006. As the train had stopped a little short of the appointed stop position when arrived at the next station, i.e., Fune-no-kagakukan station, the train was moved to the appointed stop position by remote control of the train dispatcher, and arrived at the station about 3 minutes behind schedule. Just after the train departed the station, the power supplied to the trolley was failed and the train stopped by the emergency brake. The staffs rushed to the site later, checked the situation and found that the fourth vehicle was tilting to the left and the body had contact to the trolley installed in the left sidewall of the track, and the left wheel of the first axle of the fourth vehicle had been removed and derailed.

There were 230 passengers on boarded the train, but there was no casualty.

PROBABLE CAUSES

It is considered highly probable that the train derailed because the left wheel of the first axle of the fourth vehicle had been removed from the axle and fell down into the groove on the left of the track due to the broken hub of the removed wheel.

It is considered highly probable that the hub of the removed wheel was broken by the expanded crack due to metal fatigue caused by the large stress, which was introduced by the fastening the wheel nuts while there were gaps by the "fretting wear" between the contact surface and the wheel and the fluctuating stress by train running, exceeding the fatigue limit of the material.

It is considered highly probable that the stress acting on the hub exceeded the stress limit by the lowered intensity of the hub due to the defect material and the hub which was not designed considering the stress acted by fastening wheel nuts.

PROPOSALS

The Aircraft and Railway Accidents Investigation Commission (JTSA at present) proposes the followings to the Minister of Land, Infrastructure and Transport, based on the findings through the investigation of this accident.

1. Propose about design and maintenance of the hub for the guide rail type railways.

It is considered highly probable that the hub of the removed wheel was broken by the expanded crack due to metal fatigue caused by the large stress, such as excess of the fatigue limit of the material, which was introduced by the fastening of the wheel nuts while there were gaps with the contact surface by the fretting wear and the fluctuating stress during the train running. It is considered highly probable that the stress acting on the hub exceeded the stress limit by the lowered intensity of the hub due to the defect material and that the hub was not designed considering the stress acted by fastening wheel nuts.

Therefore, Ministry of Land, Infrastructure and Transport should take the required measures about the followings.

- (1) When the hub used at present in the guide rail type railways is the type that a gap by the fretting wear exists between the contact surface and the wheel, and is designed without considering the stress will act by fastening wheel nuts, the measure should be taken such

as replacement by one having sufficient strength when the strength is found insufficient as a result of examination of the strength by checking the wearing depth.

- (2) When maintaining the hub in the guide rail type railways, the maintenance procedure considering wear should be performed.

And when the hub, used in the existing system, is designed without considering the stress described in (1), and the checked results show the insufficient strength, it is necessary to manage the wear depth and perform measures such as the crack inspection at a proper timing, until it is replaced by a hub with sufficient strength.