ISSN: 2053-3578 I.F. 12.34

ANALYSIS OF THE CONDITION OF THE WHEEL AND THE RAIL DURING THE MOVEMENT OF THE WHEEL ON THE RAIL

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Annotation: Railway vehicles are efficient due to the low rolling resistance at the contact point between the wheel and rail. To maintain this efficiency, both train operators and infrastructure owners must ensure that wheels, rails, and vehicles remain in good condition. Wheel wear, in particular, can significantly affect a vehicle's dynamic behavior and increase the dynamic forces exerted on the rail.

Key words: axle, comb, track, , symmetrical, perimeter, vertical.

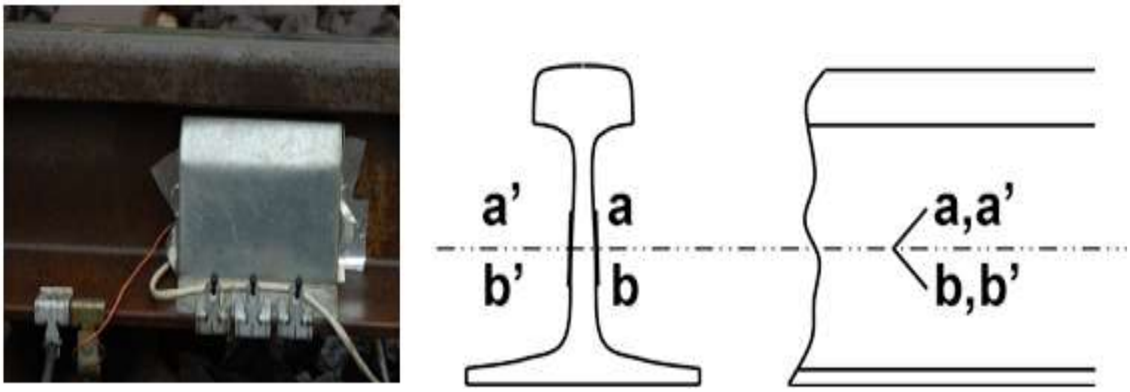
Rail transport achieves energy efficiency due to the low resistance of the rail and wheel movement. The most important dynamic element of rail transport is the interaction between the wheel and the rail. As a result of the movement of the wheel, it causes serious damage to itself and the rail, which in turn affects the dynamic balance of the rolling stock. The North American railway system uses a variety of monitoring device technologies. The technology consists in installing a special structure along the railway track that analyzes the vibrations generated by the movement of the rail and wheel. However, this technology also has a number of disadvantages, including the type of rolling stock and the weather and geographical location affecting the results of the device.

The purpose of monitoring the running part of the railway rolling stock is to check the current condition of the running part. Traditional inspection methods have several shortcomings, and therefore the development of new methods is required.

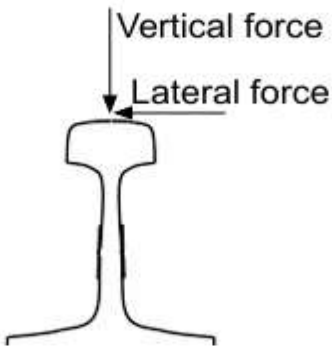
Damaged rolling stock attracted significant attention in 1985, and the first rolling stock impact detector was developed for British Railways. This system was further developed in the 1990s.

In addition, Truck performance detectors (TPD) measure vertical and horizontal forces and deformations on the wheel.

At the Luleå test center, the vertical and horizontal forces of the wheel and rail were measured at a radius of curvature of 484 m and a speed of 100 km/h, as shown in the figure. Several welded deformation sensors were used to measure the measurement devices.



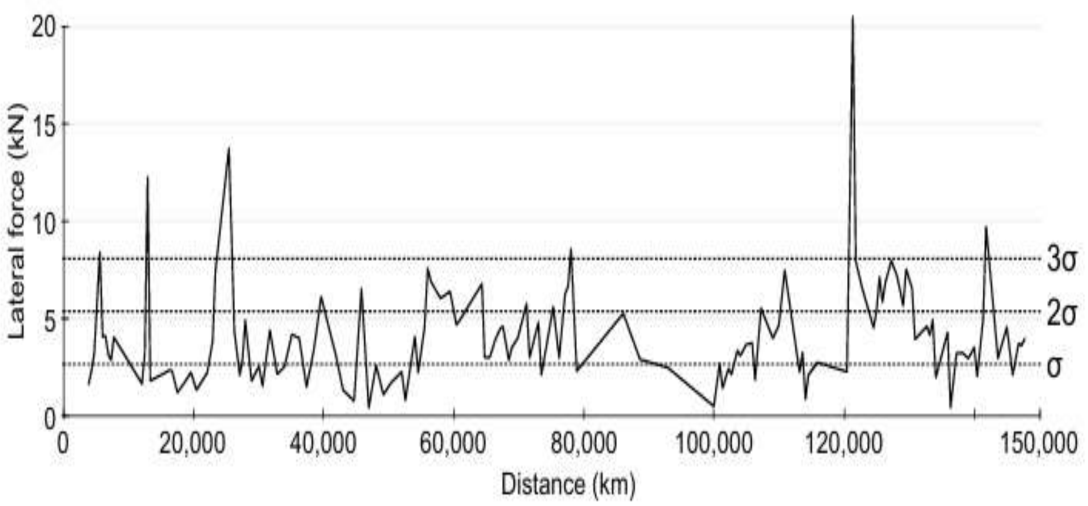
a) Installation of the measurement system b) location of the measurement system



c) influence of forces

1- Picture Measuring Device

Considering the above measurements, there is a question about the horizontal forces that the wheels of the transition will experience from time to time, even if these wheels are worn out. There are several possible reasons for these variations, including the placement of the train, the coefficient of friction, temperature, humidity, and the configuration of the garden. However, the project observed all of these factors and suggested an explanation for the variable lateral forces.



2-Picture Standard deviation for horizontal forces on the upper rail

Conclusions

The four different wheel positions on a bogie exhibit significantly varied force signatures. The leading high-rail wheel experiences consistently high forces that do not change with running distance, whereas the forces on the other three wheels increase as the distance progresses. Directional changes of the wagon—such as turning around during loading or unloading—result in noticeable differences in lateral forces on the leading low-rail wheel relative to the running distance. This may be due to minimal variations in wagon dynamics caused by wear when turning either left or right. To capture all relevant data in a single run, it is necessary to establish a second measurement point in a reverse curve with the same radius.

References

1: G. Charles, R. Goodall, and R. Dixon. Model-based condition monitoring at the wheel-rail interface. Vehicle System Dynamics, 46(Suppl. 1):415–430, 2008. 2: Joseph Kalousek. Wheel/rail damage and its relationship to track curvature. Wear, 258:1330–1335, 2005. 3:

Gerald B. Anderson and Ryan S. McWilliams. Vehicle health monitoring system de velopment and deployment. In 2003 ASME International Mechanical Engineering Congress, pages 143–148, Washington, D.C., 2003. American Society of Mechanical Engineers. 4: D. Barke and W. K. Chiu. Structural health monitoring in the railway industry: A review. Structural Health Monitoring, 4, 2005. 5: S. K. Punwani, F. Irani, R. B. Wiley, and J. Tunna. Pilot for a national detector database to enhance safety and promote preventive maintenance. In 2003 ASME International Mechanical Engineering Congress, pages 149–155, Washington, D.C., 2003. American Society of Mechanical Engineers. 6: Keith Bladon and Robert Hudd. Wayside monitoring of metro lines. In The 4th IET International Conference on Railway Condition Monitoring, Derby, UK, 2008