REMAINING LIFETIME FORECASTING BASED ON THE DYNAMIC SIMULATION OF USED CONTINUOUSLY WELDED RAILS

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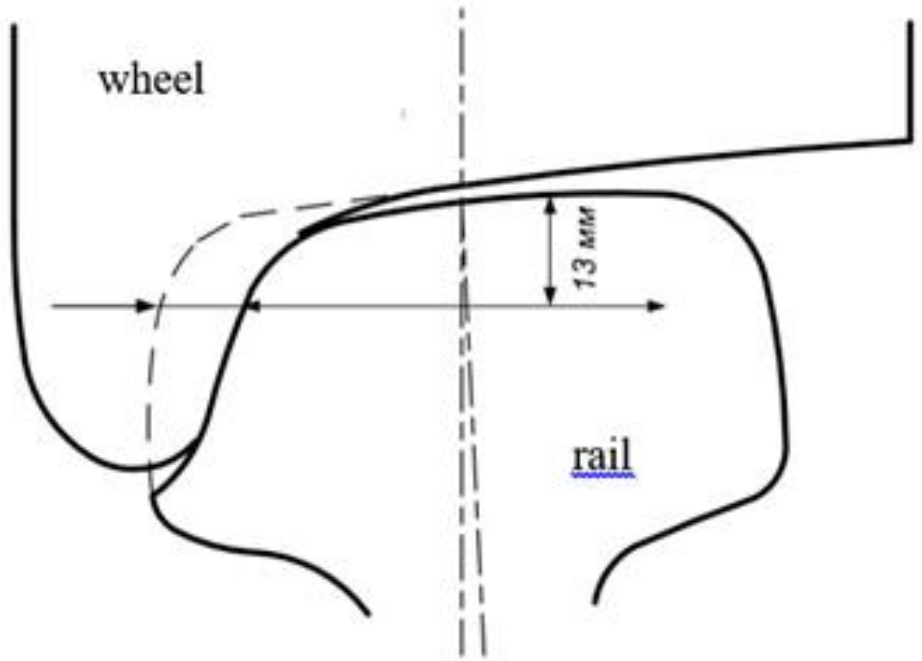
One of the basic principles of the modern track facilities policy is the maximum life extension of the permanent way elements less than 1,1 bln. tonnage. This policy allows to increase the competitiveness of the railway transport.

It is proposed to conduct a number of research to understand how some rail segments operate under various types of load, including pre-stresses that develop when the rail is fastened in the continuously welded rail and when residual stresses accumulate during the operation. To solve this problem, a mathematical model of the rail segment dynamic behaviour is presented.

The main factors that affect significantly on strong side wear:



- the intensity of wear depends on the radius of the curve;
- the growth of vertical and, particularly, horizontal track stiffness (the introduction of strong rails
- of heavy types, reinforced concrete sleepers and rigid fasteners);

- the use of heavy trains and trains of increased length, the increase of cargo transportation;
- coming into operation of new powerful locomotives;
- an overestimated value of wheel stiffness of the traction rolling stock (HB 550 and more) with plasma strengthening of the rail in relation to the rail head strength (HB 350) with an orange-peel effect of the rail surface;

Modeling of the track dynamic behaviour within two adjacent sleepers, under the operation of the wheel pair of rolling stock is proposed to perform with the use of the equations for the orthotropic flat element, pre-stressed with the longitudinal force and two moments that, in general, corresponds to the segment condition of the continuously welded rail laid in the track according to the consolidation.

The resulted dependencies of the contact force between the wheel and the rail on time, which can be applied to different models of the dynamic interaction, allow us to forecast the state of any used continuously welded rail with the determined failure probability in accordance with the optimal ratio of geometric, mechanical and structural characteristics of the track section and its operational parameters.