

**INCREASED RELIABILITY AND SAFE OPERATION OF TRAINS
USING OF INNOVATIVE TECHNICAL SOLUTIONS IN HEAVILY
LOADED TRIBOLOGICAL CONTACTS "RAIL TRACK -
ROLLING STOCK - CONTACT NETWORK"**

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In market conditions of economic development an important factor in any industry is to save resources while achieving maximum impact use of technology and systems. The economic benefits and traffic safety in rail transport largely depends on the efficiency of interaction of elements in the "rail track - rolling stock - contact network" [1].

During operation of rolling stock are constantly faced with the problem of wear of the working surfaces of the wheels, brake pads and linings current collectors (fig.1). Wear this irreversible process that leads to mandatory replacement of these elements and increasing resource costs. In addition the profile wheels is largely dependent on the dynamics of rolling stock, track impact, smoothness and implemented thrust. From the efficiency of interaction with wheel brake pads or disc depends on traffic safety and on the profile of the surface of the lining - the effectiveness of taking electricity from the contact network.



a)

b)

Fig. 1. Wear of the wheels (a) and the linings current collectors (b)

Solving the problem of reducing the wear of the working surfaces of the system "track, rolling stock - contact network" requires a comprehensive approach and taking into account the multifactorial effect on the system. Each footprint "wheel-rail", "wheel-block", "brake disc - pad", "trolley - contact network" has some resource that should be taken into account and predict the design and technical operation of vehicles. On this depends the operation efficiency of the whole system "track, rolling stock, the contact network." The methods of use of these resources include patented solution:

- Increasing resource bandages bogies through the use of new technology replacing the position of bogies in a wheelchair during the operation and, thus, extending the period of operation before regrinding;

- Reduce wear on the working surfaces of brake components by cooling the contact areas air supply, which descends into the bellows of the brake cylinders during braking; decrease in the resistance movement of trains on the establishment of a shape-memory plates on the brake discs for closing the vents when driving the rolling stock and the opening of their braking (fig. 2) [2];

- Lifetime extension pads using two current collectors working surfaces.

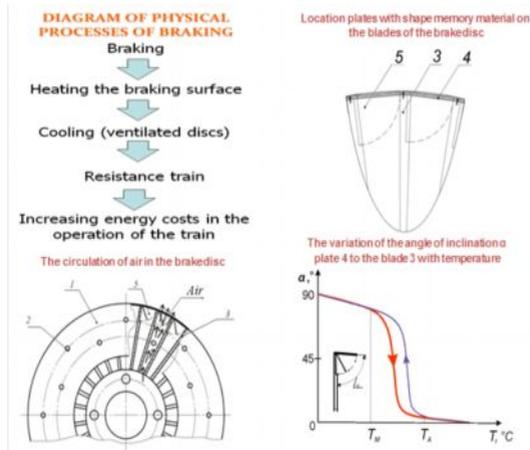


Fig. 2. Technical solutions to reduce the energy consumption of trains

References:

1. Domin R. Wear mechanisms analysis and elaboration of measures on improving the interaction of wheelset with rail track/ R. Domin, N.Gorbunov, A. Chernyak, K. Kravchenko, S. Kravchenko // Збірник наукових праць Державного економіко-технологічного університету транспорту. - 2014. - Вип. 24. - С. 81-91.
2. Деклараційний патент на корисну модель № 91595, кл. F16D 69/00. Спосіб взаємодії гальмівної колодки із колесом залізничного транспортного.

Innovative engineering solutions to improve intermediate rail fastening have been proposed. Such peculiarity of the device of intermediate rail fastening provides increased durability and working capacity of rail fastening components in terms of considerable transverse loading within the route sections with small-radius curvature. Vertical and transverse loading are of considerable importance on rail tracks of industrial transport within the curved sections [11] owing to the use of locomotive units with static vertical loading (2560–3600 kN), self-propelled dump cars (550–670 kN [12]), and railroad inclinations up to 60°. As for railroad of underground rail transport, vertical loading may reach 60–120 kN and transverse ones may demonstrate values of 20–45 kN [10]. Innovative Integrated Energy Efficiency Solutions for Railway Rolling Stock, Rail Infrastructure and Train Operation. PROJECT. PDF of project. RAILENERGY. Innovative Integrated Energy Efficiency Solutions for Railway Rolling Stock, Rail Infrastructure and Train Operation. It will be very important in the coming years to ensure a sustainable compromise between the need to continue increasing the attractiveness of trains for the passengers on the one hand and the need to prevent an uncontrollable growth of energy consumption on the other hand. In procurement and leasing projects the energy performance of new rolling stock should be predicted and validated by using the UIC/UNIFE TecRec 100_001 developed by Railenergy. Operational measures. The automation of train control was developed from there, using advances in traction control, which gave automatic acceleration and in braking, which could incorporate electrical control and automatic load compensation. The use of GSM-R radio for vital data transmission is still regarded throughout the railway industry as either "not fully proven" or "insufficiently reliable" for permanent, full-time operation. Heavily used metro lines, like those in Hong Kong, trying for a greater capacity than 30 trains per hour, will struggle to keep dwell times below 40-50 seconds at peak times. This will push the headway to two minutes or longer, regardless of the signalling system used. Similar problems exist at terminals where crossover clearance times are critical.