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FAULTLESS OPERATION OF A RAIL-SLEEPER LATTICE AT DEVELOPMENT OF TONNAGE

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Introductions. Reliability of a design of a rail-sleeper lattice, under the influence of train loading concerns practical problems of a track economy. The main structure of the superstructure on the railways of Ukraine is still a seamless track on reinforced concrete sleepers, which is operated for almost 75% of the length of the main track. The following study is based on the construction of a rail-sleeper lattice with a length of 1 km of seamless track with rail slabs welded from rails type R-65, up to 800 m long on reinforced concrete sleepers with the most common plot 1840 shp / km and with intermediate fastening type KB

Aim. Determining the reliability of the design of the rail-sleeper lattice seamless track when operating tonnage.

Materials and methods. "Rules of technical operation of the railways of Ukraine" require the need to ensure safe and smooth movement of trains at speeds set at this site. This means that the technical condition of the track structure during the cycle of its operation must meet the conditions of a certain section of the railway.

When the tonnage is increased, there is a steady tendency of deterioration of the technical condition of the track structure due to the accumulation of faults and defects, which leads to a decrease in the level of operational reliability of the track structure and violation of train safety conditions.

Results and discussion. The design of the rail-sleeper lattice is an object of wear (technical systems), which is characterized by the fact that the failure rate λ during their operation increases. The method of engineering calculations of the reliability of technical systems, as a rule, considers a stationary process that does not take into account the process of wear of the technical system. This can lead to an

overestimation of its reliability characteristics, which in turn can cause undesirable situations during the operation of the structure.

Table 1 shows the results of the values of the probability of failure-free operation at time t_i rails R_{rails} , sleepers $R_{Sleepers}$ and intermediate fasteners $R_{fastening}$ and as a general conclusion of the design $R_{RSHR}(t_i)$, depending on the earned tonnage T , million tons gross, for the case when the section length in 1 km no work is performed to replace unusable sleepers.

Table 1

The value of the probability of failure of the structure $R_{RSHR}(t_i)$ at T_i

T , млн. т	100	300	500	700	800
$R_{rails}(t_i)$	0,99996	0,99905	0,99562	0,98700	0,98208
$R_{Sleepers}(t_i)$	0,99999	0,99993	0,99980	0,99961	0,99949
$R_{fastening}(t_i)$	0,9972	0,9236	0,6462	0,0293	-
$R_{RSHR}(t_i)$	0,9972	0,9227	0,6432	0,0289	-

The analysis of the calculation results shows that the probability of trouble-free operation of the rail-sleeper lattice (for the accepted conditions of the current maintenance of the track structure) after operating 400 million tons gross is reduced to a critical level and is 0.8.

Conclusions. The general provisions for assessing the reliability of wear of technical systems during operation are considered.