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V. F. USHKALOV, T. F. MOKRII, I. YU. MALYSHEVA, L. G. LAPINA, S. S. PASICHNYK, N. V. BEZRUKAVYI

WHEEL WEAR REDUCTION ON 1520 mm GAUGE RAILWAYS

Institute of Technical Mechanics
of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine
15 Leshko-Popel St., 49005,Dnipro, Ukraine; e-mail: Mokrii.T.F@nas.gov.ua

This paper is devoted to the solution of the problem of freight car wheel wear reduction on 1520 mm gauge railways (the former USSR). The paper gives a brief description of the comprehensive retrofit of standard freight-car trucks (model 18-100) proposed at the Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine (ITM of NASU and SSAU) and introduced on the Ukrainian railways. The retrofit involves the use of US companies' devices adapted to the former USSR's countries and the ITM-73 wear-resistant wheel profile specially developed at the ITM of NASU and SSAU; it offers a several-fold increase in the life of critical running gear assemblies and makes it possible to reduce wheel and rail contact wear by a factor of 2–2.5.

The aim of the work was to refine the comprehensive retrofit of freight-car trucks, namely, to develop new wear-resistant wheel profiles, in particular with account for the shape of worn rail heads. An approximate method was proposed for the solution of the wheel–rail interaction problem with the determination of the position and dimensions of nonelliptic contact patches, including the case of a conformal contact. Using this method, new wheel profiles were developed for worn wheel machining (ITM-73-01) and for new wheels for cars with an axle load of 23.5 tf (ITM-73-02) and 25 tf (ITM-73-03). Use was made of methods of mathematical simulation, numerical integration, oscillation theory, and statistical dynamics.

The data of theoretical and experimental studies presented in the paper show that the average wheel flange wear rate for freight cars with comprehensively retrofitted trucks whose wheels have the ITM-73-01 profile is 3.5 – 5 times lower than for a standard car with the standard wheel profile at the same kilometerage. According to predictive estimates, for cars with comprehensively retrofitted trucks the wear of wheels with the ITM-73-02 or ITM-73-03 profile will be still lower.

Keywords: *freight-cat truck, comprehensive retrofit, wheel–rail pair wear, wear-resistant wheel profile, car ride quality, increased axle load.*

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