Method of Preventive Repair Modes of Vehicles Elements

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Key words: Reliability of vehicles, preventive repair, composite distribution, statistic models, Life Duration Reduction

While determining the Preventive Maintenance Modes (PMM) of vehicles' constructional elements it is customary nowadays to apply methods used for electronic equipment. Such methods do not take into account the dynamic environment under which mechanical constructional elements work, and in particular the considerable deformations (changing geometrical parameters) they undergo. The above causes life duration reduction (LDR), and consequently the effectiveness of maintenance is reduced.

This paper on the determination of PMM of vehicle elements takes into consideration the rate of LDR, the relative cost of preventive and after failures repairs, and the reliability specification of replacement elements. The Theory of Renewal presents a model describing the basic relations between PMM of replacement elements and their reliability specifications like life duration, function of renewal (the conditional number of element failures between maintenances), etc.. This model is unsuitable for mechanical constructional elements since it assumes fixed life duration. Therefore, the need arises to introduce variable life duration into the model.

To this purpose we developed equations for defining the parameters (the mean and coefficient of variation) of composite distribution of vehicle elements life duration. Based on the above parameters when applied to the method of Monte Carlo, we arrived at a regressive model between Functions of Renewal, PMM, and parameters of operational reliability of vehicle elements.

This work describes in detail an applied mathematical model, which allows us to determine the optimal modes of vehicle elements' preventive maintenance-replacement, under the conditions where the vehicle elements are subject to life duration reduction (LDR).

A practical use of the offered method is shown in an example of optimization of the period of replacement of vehicle elements, which is part of its preventive maintenance. The presented technique demonstrates that data obtained from a vehicle's operational reliability history can be used successfully to optimize the conditions of service. This model increases vehicle service profit levels, safety, and reliability, by simply changing the service periods.