A Case Study of Determining the Times of Overhauls and the Number of Spare Parts for Repairable Items in Rolling Stocks with Simulation

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Abstract : It is essential to secure high availability of railway vehicles to realize high quality and efficiency of railway service. Once the availability decreased, planned railway service could not be provided or more cars need to be reserved. additional cars need to be purchased or the frequency of railway service could be decreased. Such situation would be a big loss in terms of quality and cost related to railway service. Therefore, we make various efforts to get high availability of railway vehicles. Because it is a big loss to operators, we make various efforts to get high availability of railway vehicles. To secure high availability, the idle time of the vehicle needs to be reduced and the following methods are applied to railway vehicles. First, through modularization design, exchange time for line replaceable units is reduced which makes railway vehicles could be put into the service quickly. Second, to reduce periodic preventive maintenance time, preventive maintenance with short period would be proceeded test oriented to minimize the maintenance time, and reliability is secured through overhauls for each main component. With such design changes for railway vehicles, modularized components are exchanged first at the time of vehicle failure or overhaul so that vehicles could be put into the service quickly and exchanged components are repaired or overhauled. Therefore, spare components are required for any future failures or overhauls. And, as components are modularized and costs for components are high, it is considerably important to get reasonable quantities of spare components. Especially, when a number of railway vehicles were put into the service simultaneously, the time of overhauls come almost at the same time. Thus, for some vehicles, components need to be exchanged and overhauled before appointed overhaul period so that these components could be secured as spare parts for the next vehicle's component overhaul. For this reason, components overhaul time and spare parts quantities should be decided at the same time. This study deals with the time of overhauls for repairable components of railway vehicles and the calculation of spare parts quantities in consideration of future failure/overhauls. However, as railway vehicles are used according to the service schedule, maintenance work cannot be proceeded after the service was closed thus it is quite difficult to resolve this situation mathematically. In this study, Simulation software system is used in this study for analyzing the time of overhauls for repairable components of railway vehicles and the spare parts for the railway systems.

Keywords : overhaul time, rolling stocks, simulation, spare parts

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