При реализации системы сервисного обслуживания с управлением жизненным циклом становится возможным уточнение реальной стоимости эксплуатационного этапа для ТПС, что особенно важно при использовании кредитных средств при их покупке или финансировании из инвестиционных фондов. Стоит отметить, что применение системы сервисного обслуживания дает шанс значительно сократить затраты на ТО и заметно повысить эксплуатационную готовность и надежность парка. Модернизация на определенных этапах жизненного цикла поможет сохранять локомотив в востребованном техническом состоянии все предельно допустимое время. Учитывая, что сервисная организация фактически берет на себя полную ответственность за техническое состояние обслуживаемого парка локомотивов, следует дать ей право самой определять периодичность ТО и ремонтов.

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SERVICE MAINTENANCE OF TRACTION ROLLING STOCK WITH LIFECYCLE MANAGEMENT

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ABSTRACT

Repair depots, being a part of the Russian Railways' system, cannot independently fully provide satisfactory condition of the locomotive fleet in accordance with modern requirements. In this situation, it is required to modify the maintenance system to achieve the greatest efficiency. In this case, the base should be a service maintenance system of traction rolling stock (TRS) with the ability to manage the lifecycle. It is this version the authors evaluated, investigating not only corporate motivation, but also common approaches to the organization and preparation of maintenance. In particular, the authors consider the value of information resources, modernization of locomotives at certain stages of the life cycle, as well as cost factors of the whole complex of maintenance and repair work in the operation of TRS.

ENGLISH SUMMARY

Background.

In the process of reforming railway transport in Russia in recent years, management and operation of rolling stock have undergone multiple changes.

Until recently, the main production force, engaged in maintenance and repair of locomotives were operating and repair depots. They belong to Directorate for Traction (DT) and the Directorate for repair of traction rolling stock (DR). I.e. within the system of JSC «Russian Railways» there is DT as an owner of locomotives, customer in relation to DR, and it includes 16 regional directorates, combining 112 locomotive repairs depots.

However, repair depots belonging to the «Russian Railways» cannot independently fully provide satisfactory condition of the locomotive fleet, in accordance with modern technical requirements, and still it should be noted that in recent years deliveries of new locomotives have resumed. In fact it must be noted that available capacity of repair enterprises, which previously provided service maintenance and operation within the framework of Traffic Ministry, decreased tenfold [1].

Effective solution of rolling stock operation problems seems possible only when a powerful high-tech service maintenance system is created that would guarantee quick and unproblematic repair of all types and modernization on the basis of life-cycle management of locomotives. At the same time, the operational period of the life cycle should be particularly emphasized when at the same time there is a need for cost minimization and maintaining high technical readiness of production. Such requirements determine analytical approach to lifecycle management.

Objective.

The objective of the authors is to investigate the maintenance service system of traction rolling stock from different perspectives.

Methods.

The authors use descriptive method and analytical approach.

Results.

Lifecycle management is a multi-objective problem, which includes extensive range of activities that result in greater operational efficiency, availability, reliability, failures minimization and downtime.

Expenditure on TRS maintenance is largely dependent on the choice of service maintenance and repair systems. The existing system of preventive maintenance is the main system in JSC «Russian Railways». However, this system is unable to meet the needs of TRS owner in the form in which it exists today. Organizations involved in servicing the locomotive fleet, are at an early stage of development and have

a significant amount of resources, which cannot always be improved. Long way to improve [2, 3] and transform the system of preventive maintenance makes it possible to take this system only as a basis for suggesting the construction of a new one that will provide flexible lifecycle management of TRS.

Analysis of statistical data on downtime shows that more than half of all failures are the consequences of previous repairs. Downtime at such kinds of failure is comparable with the downtime during TR-2 (Pic. 1).

Not only quality but also efficiency of the maintenance and repair has a significant technical and economic weight. And this figure is also far from ideal (Pic. 2).

After analyzing maintenance systems, authors note some qualitative differences. Their main task is performance of a single TRS repair on a single enterprise. In this case the responsibility for the fact of repairs is assumed. Moreover, the system itself does not provide direct interest in the life-cycle management, failures minimization, increase in overhaul life and reliability, that is all that anyway must be ensured during the process, but there are no clear economic commitments.

The reverse situation can be observed if the organization is based on the concept of service maintenance, the main task of which is to avoid financial losses in the operation of TRS. And it is not just about corporate motivation (Pic. 3), but the overall approach to organizing and preparing maintenance.

One of the advantages of service maintenance is a comprehensive approach to the process organization. The service organization is presented as a centralized complex of enterprises closely associated with the manufacturer and supported by effective information and analysis system that ensures responsibility of the organization for the entire life cycle of TRS, rather – for the entire operational phase of the life cycle of the machine.

Among the reasons for transition to service maintenance is lack of reliable and efficient supply channel for spare parts in a system of preventive maintenance. Standard situation is when one depot has a large number of suppliers, and as a result violated terms of supply and complicated organization of logistics service. In contrast, a service organization has the opportunity to get spare parts directly from TRS manufacturing factory or create its own enterprise for production of spare parts, which significantly reduces the level of prices, counterfeit and increases system`s efficiency.

The most favorable position will be occupied by that structure, in which the hierarchy of service system begins with the manufacturer of TRS. In this way can be achieved a strong bond that allows closely cooperate in solving not only the general technical, but also sectorial objectives. It is equally true for changes in the design documentation on the results of operation and repair statistics and the broader opportunities for modernization at different stages of the life cycle, especially during overhaul of rolling stock that would be very difficult without the participation of the manufacturing factory.

A core value in the maintenance service system is information obtained as a result of the collection, compilation and analysis of data on operational parameters of diagnostic systems, the degree of change, characteristics of overhaul life, repairs, failure statistics, their elimination and minimization, technological indicators of repair. Collection, classification and comprehensive analytical approach to the classification of information and taking an adequate decision in problem cases is a task for situation center (Pic. 5).

Resource to improve the maintenance service system can be an introduction to the structure of geographically distributed fleet of reserve locomotives that would significantly reduce the total economic losses of a TRS owner by minimizing locomotive`s downtime.

Conclusion.

When implementing maintenance service system with lifecycle management, it becomes possible to clarify the real value of the operational phase for TRS, which is especially important when using credit funds by their purchasing or financing of investment funds. It should be noted that the application of maintenance service system has a chance to significantly reduce the cost of maintenance and significantly improve operating availability and reliability of the fleet. Modernization at certain stages of the life cycle will help keep the locomotive in the sought technical state during maximum allowable time. Given that the service organization actually takes full responsibility for the technical condition of the serviced locomotive fleet, it should be given a right to determine itself the frequency of maintenance and repairs.

Keywords: railway rolling stock, locomotive, service maintenance, maintenance, life-cycle management.

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