REDUCE TIME AND FUEL CONSUMPTION IN TRAIN CONTROL MODE

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СОКРАТИТЬ ВРЕМЯ И РАСХОД ТОПЛИВА В РЕЖИМЕ УПРАВЛЕНИЯ ПОЕЗДОМ

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ABSTRACT.

The selection of the optimal control method of locomotives on the railways of Uzbekistan is aimed at reducing fuel resources and locomotive movement time. The procedure for efficient control of locomotives moving in the direction of the Tinchlik-Nurota railway section is shown, and examples of calculating the effective movement of the locomotive at specified points of the Tinchlik-Nurota section are given. Improvement of transportation works in locomotives has been carried out to achieve economic efficiency in a certain volume, and it has been shown that by choosing the optimal control mode of locomotives, it is possible to achieve the standard time consumption without any difficulties. Improved control modes and gradation of properly selected positions in the locomotive control mode were proposed, and due to this, a significant reduction in the fuel consumption time mode was seen. The calculations carried out on the selection of improved management, improvement of the mode of operation on all road profiles and reduction of service time of locomotives, work on normalization of fuel consumption of the railways of Uzbekistan, will make it possible to achieve national economic efficiency.

АННОТАЦИЯ.

Выбор оптимального метода управления локомотивами на железных дорогах Узбекистана направлен на сокращение топливных ресурсов и времени движения локомотива. Показана процедура эффективного управления движением локомотивов в направлении железнодорожного участка Тинчлик-

Нурота и приведены примеры расчета эффективного движения локомотива в заданных точках участка Тинчлик-Нурота. Проведено совершенствование перевозочных работ на локомотивах для достижения экономической эффективности в определенном объеме и показано, что путем выбора оптимального режима управления локомотивами можно без затруднений добиться нормотрат времени. Были предложены усовершенствованные режимы управления и градация правильно выбранных позиций в режиме управления локомотивом, за счет чего было замечено существенное сокращение режима времени расхода топлива. Проведенные расчеты по выбору усовершенствованного управления, улучшению режима работы на всех профилях дорог и сокращению сроков службы локомотивов, работы по нормализации расхода топлива железных дорог Узбекистана позволят добиться народнохозяйственной эффективности.

Keywords – payoff parameter, work option, generalized table, optimal trajectory, mode characteristics, choice.

Ключевые слова – параметр выигрыша, вариант работы, обобщённая таблица, оптимальная траектория, характеристика режима, выбор.

INTRODUCTION

This study is dedicated to the justification of increasing the fuel efficiency of locomotive transportation by improving the mode and mode of locomotive management in the real conditions of the organization of transportation on the locomotives of Uzbekistan railways. Fuel consumption improvement calculations for the selected Tinchlik-Nurota section (route) take into account the travel times and standard fuel consumption for the crossing points of this section, the capacity of this section and the data for train control. Annual reduction of the final version of the slave time fuel-efficient mode was carried out, while at the same time, Uzbekistan Railways includes the selection of the minimum amount of costs allocated to locomotives.

At present, the towing calculation works by the road authorities ensure the implementation of a certain transport, but determine the maximum load-carrying capacity of the sections without reflecting the actual average conditions. The practical organization of locomotive transportation services, if they are carried out according to the average current conditions of locomotive transportation works in the above-mentioned sections and taking into account the perspective of their improvement works, it is important that locomotives are reflected in the traction calculations.

EXPERIMENTAL WORK. MATERIAL

According to the results of the calculations and the above-mentioned recommendations, the directional operation of locomotives on the Tinchlik-Nurota section is somewhat inconsistent with the fast delivery of yuccas on the section.

If we achieve changes in Eg, Egn, and Ex values depending on the mode of operation of the locomotive and the mode of control by a specialist driver in the sections between Tinchlik-Nurota presented in Figure 1, the summary annual indicator of income parameters, Uzbekistan Railways If the economic costs of trains are reduced, then according to the control mode given by the specialist, it would be appropriate to reduce the time of movement of trains and reduce the standard fuel consumption to a minimum level. Of course, in this case, the use of locomotive control modes by using an improved way of control requires a very important profession.

For example, practical research work was carried out on UzTE16M3 diesel locomotive No. 001 for freight locomotives on the Tinchlik-Nurota route, and the total distance on this route was 173.5 km Q=2081 tons, 262 minutes in the given table and the actual technical speed 48 km/h, section A-471.9 kg, section B-643.5 kg, section V-665 kg according to table standards: Total fuel consumption of 1750.4 kg was determined. The calculation of Eg value for the annual reduced expenses of Uzbekistan Railways for planning working conditions gave the value of Eg=24500000 soums per month. Calculations made with the selection of the route time in the following section and the control mode of the movement of the locomotive made it possible to save E=598 kg of diesel fuel in the full volume of the locomotive for the total movement time of the locomotive tx=198 minutes and, accordingly, the total cost Eg=24500000 soums per month, i.e. reduced by 3.8 percent. If there are sections of the road profile that are difficult to follow, the extremely long travel time in the Tikhlik-Nurota sections will cause the Eg values to shift "to the right" in these sections (shown in Figure 1). UzTE16M3 confirms the need to calculate the effective running time of the locomotive from Tn, the most effective running time of the locomotive.

Table-1. Service station for locomotives.

Name of individual stations	Distance, km	Time on the schedule	Current time	Difference	Time		Current technical speed	Technical speed in the table	Difference
					departure	to arrive			
Tinchlik - Karm	9,6	14	14	0	8:27	8:41	41,7	41,7	0
Karmana - Kanimex	23,4	32	23	-9	8:41	9:04	61	44	17
Kanimex - Zafarabad	38	44	36	-8	9:04	9:40	63	52	11
Zafarabad - Gulobod	34,2	42	34	-8	9:40	10:14	61	49	12

Gulobod - Taraqqiyet	14,3	18	14	-4	10:14	10:28	62	47	15
Taraqqiyet - Karakatta	11,5	16	19	+3	10:28	10:47	37	44	+7
Karakatta - Yuksalish	14,1	21	17	-4	10:49	11:06	50	40	10
Yuksalish-Mustaqillik	15	28	27	-1	11:06	11:33	33	32	1
Mustaqillik - Nurot	13,4	47	31	-16	11:33	12:04	26	17	9
Total	**173,5**	**262**	**215**	**47**			**48**	**41**	**7**

Table 1 and Figure 1 show calculations for Tinchlik - Karmana, Karmana - Kanimex, Kanimex - Zafarabad, Zafarabad - Gulabad, Gulabad - Taraqqiet, Taraqqiet - Karakatta, Karakatta - Ascension, Ascension – Tinchlik, Tinchlik - Nurota sections. the results of the book are presented, which show the feasibility of implementing the effective operation of railways for freight transportation. The following preliminary data were obtained to justify the optimization of the fuel ratio.

METHOD

Recommendations for the selection of an improved control mode by experts and drivers Pt Vr should cover all possible cases of the combination of the values of Q=1750 and m=36 for this option of the operation, according to our proposal tp=const , that is, according to the train schedule given For the accepted Vr operation, we consider the entire zone of Qn-Qq, Mn-Mk values (variation range) as approximately constant, we divide the total resistance to the movement Wk by gradations based on the acceptance condition, and its value is determined by the following formula we allow you to find.

$$W_k = P_0(\alpha w_0' + i_{kc}) + Q(\alpha c + i_{kc}) + \alpha c_v m$$

Therefore, the vibration limit *Wk=500-1000 kg/force Vr can be set for this variant of operation, system weight gradation Q and number of system axes m. Must be at the exit. The method given by us shows that optimal fuel efficiency is achieved in the operation of locomotives. It allows us to regulate fuel consumption through the gradation we use.

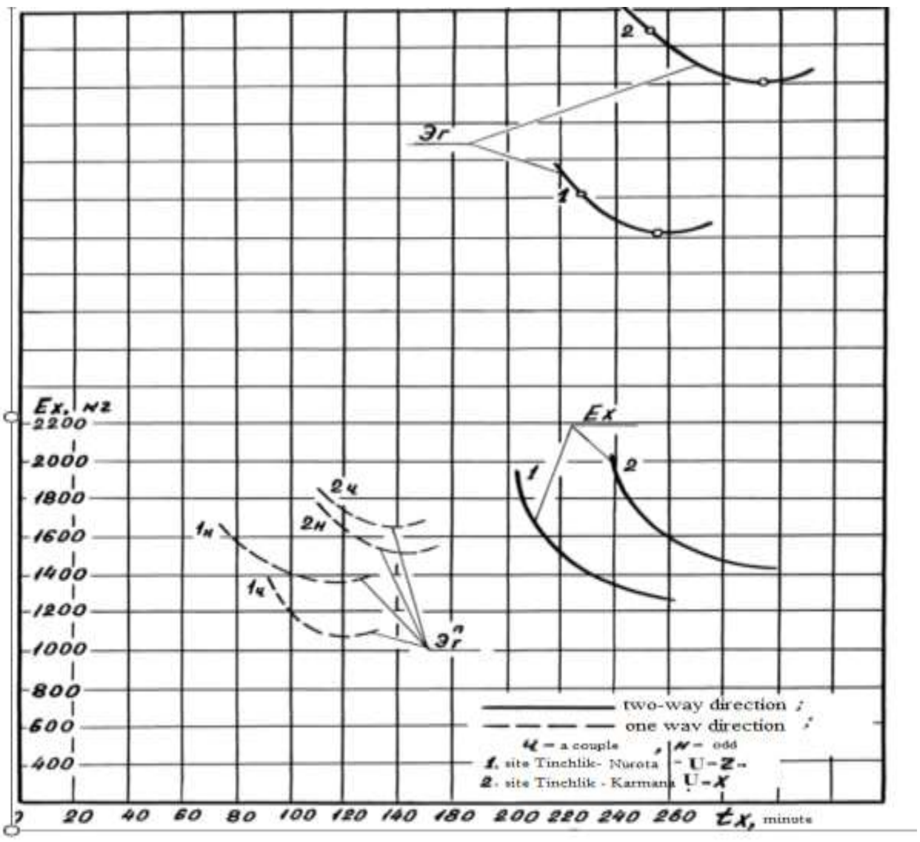

Figure 1. In Tinchlik-Nurota sections, the values of Eg, Egn, and Ex should change depending on the locomotive control mode and the selected mode of the specialist and driver.

The work performed in these practices, as well as the examples and practical calculations show that, as a rule, the driving time of the course for the traffic schedule is more than the time obtained as a result of weight calculations according to the recommendations [2,3] ra takes less time in the specified section. It is shown in the schedule of trains related to the desire to reduce the fuel consumption of locomotives on the site by a certain amount and to ensure a certain level of reliability of the operation of locomotives.

However, changes in the running time of these locomotives are mainly based on experience with appropriate feasibility studies.

The skill shown in the work done allows us to change the running time of the locomotive for specific target conditions, which provides effective economical locomotive costs. Using the high-probability deterministic position of nkc with the average weight of the locomotive Q_ for each stage and the average number of axles in the train mp-280, it is possible to carry out traction calculations in the railway administration, which makes their results realistic are solutions that approximate conditions and improve conditions.

Determining the effective improved position of the locomotive driver is based on work experience and computerized improved fuel economy guidelines and economic calculations. In this case, due to the corresponding change of positions of the locomotive driver with Q≠Qr, it is possible to fulfill the set time.

In the development of the schedule of locomotives, it is possible to give an indefinite time for the locomotive to travel along the route, but also the limits of its change from the value of the effective small tr=daq obtained at the calculated position of the locomotive driver, until the effective movement time of the locomotive is up to tn*. Then the time standards of the locomotive schedule will not deteriorate and there will be no difficulty in laying the railway lines or reducing the throughput, which means that the locomotive will have to be used at or near the most improved time.

This provides a certain volume of locomotive transportation work and allows to obtain greater national-economic efficiency. When drawing up a train schedule, all possibilities should be used to bring the accepted movement times closer to their effective values.

Let the above-mentioned locomotive's time on the timetable be tp = 262 min and the actual time of effective locomotive movement was tp*=215 min. Reducing the time of the incoming locomotive by 47 minutes in this direction during the preparation of the traffic schedule is also the reason for the reduction of fuel consumption of UzTE16M3 number 001. In this case, the estimated travel time for an odd-route train is not calculated, but it is recommended to consider it acceptable, and significant savings can be achieved without compromising the quality of the train schedule. Stopping time is no longer 8 minutes, but it is enough to take 4 minutes, which does not cause any difficulties. The availability of the currently available minimum tpdaq to effective tp* driving time variation facilitates scheduling and improves transportation efficiency. Appropriate experimental calculations and practical verification of these proposals are desirable.

Computer software for QP, MP, ZP and NKC makes it possible to take into account specific opportunities for improving the organization and technology of locomotive transportation. Let us distinguish the following software calculations

RESULT AND DISCUSSION.

TABLE 2 Economical in operating locomotives.

Q_r va T_r options		minute	E, kg		E_x soum/train. plot	E_g soum/year
not real options	**1. Calculated according to PTR** [1] (n_k^p, q_0=17t/aks, d=0,675)	112	940	22,8	180700,5	200050010
	2 Accepted for graphic ,	115	910	24,3	180600,0	218022500

real options	**3. Average real conditions** ,	115	870	30,1	170070,5	261722500
	4. Moderately optimal: for conditions:, ,,	136	1750	10,8	155000,0	247602600

As can be seen from the program data shown above, the first two work options are the most useful, while they have not been used in practice. There is practically no scheduled cargo transportation by freight trains weighing 3400 tons and 3200 tons.

In practice, this given cargo flow is carried out by trains with an average weight of 2081 tons, which significantly reduces the efficiency of locomotive transportation operations (option 4). But this can be improved by choosing an effective (effective) Rt* and tp* and reducing the cost of funds for a given load flow by almost 6-7%.

All of the above confirms the need for software calculations with a system of effective control of the process of locomotive transportation operations, and thus to study the possibilities of reducing the consumption of fuel and energy resources in order to optimize the transportation of trains by using optimal improved modes of movement. It is important to carry out researches in sections l, including railways of Uzbekistan.

It is necessary to continue these studies on the basis of existing and newly developed mathematical methods of effective control theory, taking into account the subsequent introduction of their results into the practice of railway locomotive locomotive complex enterprises.

CONCLUSION

Currently, practical research is being conducted on the railways of Uzbekistan to save fuel consumption and reduce electricity consumption in electric locomotives.

At the same time, work on improving the efficiency of the fuel standard was carried out in the given sections, and practical work on optimizing the fuel consumption standard was shown in the works being carried out with the locomotive driver and specialists.

The research carried out on the UzTE16M3 locomotive shows that the optimized control given by us, by modifying the given slopes of the Tinchlik-Nurota track profile and moving in the selected positions, the high values in the above table were achieved. It is envisaged that the fuel savings achieved by the method chosen by us will be implemented in other directions of the railways of Uzbekistan. Work is being carried out to show the locomotive control mode in the form of a different profile road.

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