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# Determination of Residential Service of Locomotives in the Locomotive Park of JSC "Uzbekistan Railways"

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**ABSTRACT**

In this article, the technical analysis of the types of traction motion composition existing in the locomotive park of JSC "Uzbek railways" and currently in use is discussed. Terms of use of locomotives and the procedure for determining the residual service life by diagnosing the main frame structure of locomotives that have passed the service life have been discussed.

***KEYWORDS:*** *Technical condition of locomotive Park, number of locomotives, year of manufacture, order of disposal of residual service life, composition of traction action*

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## INTRODUCTION

The safety, reliability and timeliness of delivery of goods and passengers are of paramount importance in the transportation of goods and passengers on the railways of JSC "Uzbekistan Railways". Keeping it in good condition at all times is a daunting task. Maneuvering locomotives of TEM2 and ChME3 types are used in the locomotive farm of JSC "Uzbekistan Railways" as an integral part of freight and passenger transportation at the railway station for sorting, distribution and formation of rolling stock [1].

## LITERATURE ANALYSIS AND METHODOLOGY:

The locomotive fleet of JSC "Uzbekistan Railways" is constantly updated with modern electric locomotives carrying freight and passengers. Table 1 below provides an analysis of the number of locomotive fleets of JSC "Uzbekistan Railways" in 2020-2021.The analysis of the number of locomotive fleet of JSC "Uzbekistan Railways" in 2020-2021 is given.

| № | Locomotive type | Location of the locomotive park in 2020 | Status of the locomotive park in 2021 |
|---|---|---|---|
| 1 | Electric locomotives | 109 | 117 |
| 2 | Diesel locomotives | 94 | 88 |
| 3 | Electro sections | 18 | 18 |
| 4 | Maneuvering locomotives | 173 | 173 |
| 5 | (TEM2 and ChME3) | **394** | **396** |

**Table 1: Analysis of the number of locomotive fleet of JSC "Uzbekistan Railways" in 2020-2021.**

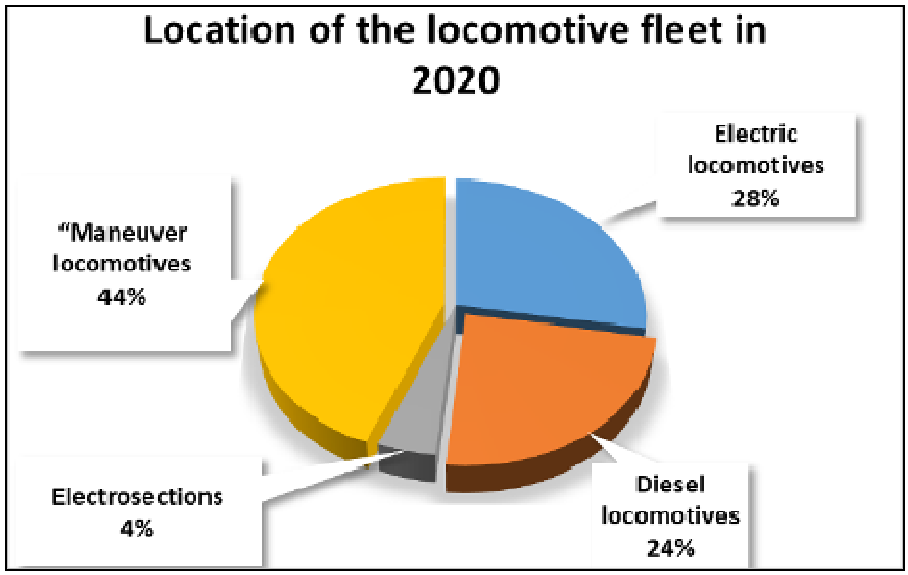



**Diagram 1: Location of the locomotive fleet in 2020**

The first and second diagrams show the percentage of types of traction movements in 2020-2021.

The condition of the locomotive fleet of JSC "Uzbekistan Railways" in 2020, according to the first diagram, is 44% of shunting locomotives, 28% of electric locomotives, 24% of diesel locomotives and 4% of electric sections.

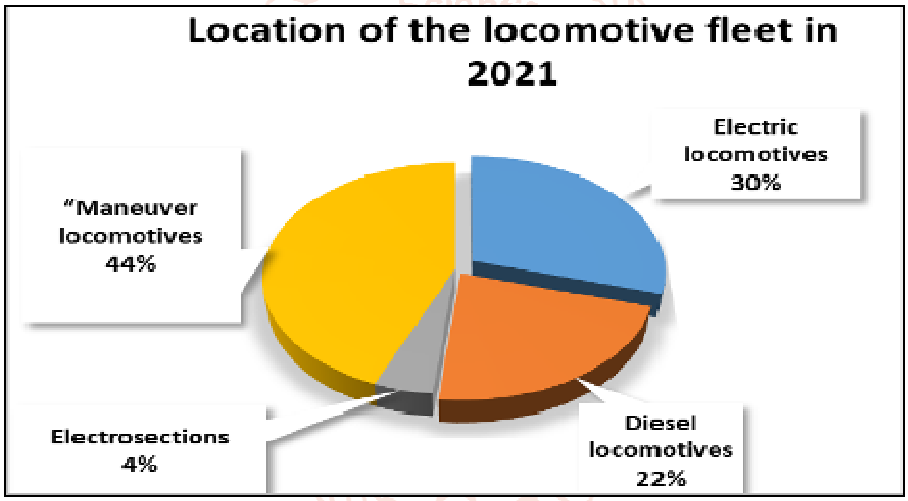



**Diagram 2: Location of the locomotive fleet in 2021**

According to the second diagram, the condition of the locomotive fleet of JSC "Uzbekistan Railways" in 2021 is 44% of shunting locomotives, 30% of electric locomotives, 22% of diesel locomotives and 4% of electric sections.

In the locomotive fleet in 2020-2021, shunting locomotives (TEM2 and ChME3) will account for 44%, electric sections 4%, and we can see that the figure has not changed. The changes were mainly due to the purchase of modern electric locomotives from 28% to 30%, while the number of diesel locomotives decreased from 24% to 22% due to the expiration of their service life. The types and number of traction trains allow to determine the average age of the locomotive fleet on the basis of their integral relationship with the years of production (age) [2].Table 2 below provides an analysis of the types of traction trains currently in operation in the locomotive fleet of JSC "Uzbekistan Railways" by year of manufacture (age).

| № | The type of traction structure | 10 upto | 10 and 20 upto | 20 and 30 upto | More than 30 years | total |
|---|---|---|---|---|---|---|
| 1 | Electric locomotives | 44 | 12 | 30 | 30 | 116 |
| 2 | Diesel locomotives | 45 | 7 | 9 | 99 | 160 |
| 3 | Maneuvering locomotives | - | - | 12 | 185 | 197 |
| 4 | Total locomotives | 89 | 19 | 51 | 314 | 473 |

**Table 2: The types of traction rolling stock currently in operation in the locomotive fleet of JSC "Uzbekistan Railways".**

As can be seen from Table 2 of the locomotive fleet of JSC "Uzbekistan Railways", the age of shunting locomotives in the range of 10 to 20 years is not specified, as there are no shunting locomotives in the range of 10 to 20 years. not purchased [3].

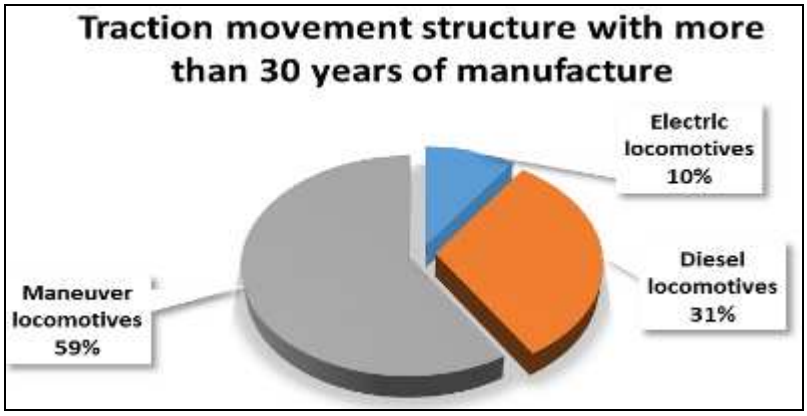



**Diagram 3: Locomotivethe traction structure of the park, which is 30 years old**

The locomotive fleet consists of shunting locomotives with 59%, electric locomotives with 10% and diesel locomotives with 31% of traction. carried out.With the extension of service life, all major repairs are regulated by regulations. The analysis of the years of production of shunting locomotives type TEM2 in the locomotive fleet of JSC "Uzbekistan Railways" is given in Table 3.

| № | Maneuver locomotive type | 30 to 40 years | 40 and 50 Up to | 50 More than a year | total |
|---|---|---|---|---|---|
| **1** | **TƏM2** | 22 | 86 | 24 | **132** |

**Table 3:Production age of TEM2 type in the current operation of the locomotive fleet of JSC "Uzbekistan Railways".**

In the coming years, a number of problems will arise: on the one hand, the use of obsolete rolling stock will increase the cost of maintaining it in good condition, on the other hand, due to lack of rolling stock, it is impossible to carry out shunting operations on the locomotive farm.Due to limited investment opportunities, it is very difficult to replace the new generation of shunting locomotives with new ones. .

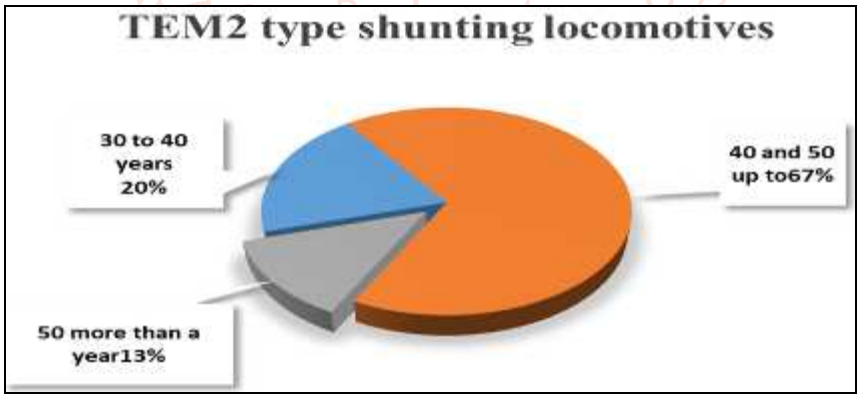



**Diagram 4: TEM2condition of locomotives of the type**

If we look at the third table in the form of a diagram, it is 17% for 30 to 40 years, 65% for 40 to 50 years, and 18% for those over 50 years. Extension of service life through overhaul of shunting locomotives of type TEM2 is carried out on the basis of regulations and this period should not exceed 50 years.From the fourth diagram we can see that one-fifth of TEM2 locomotives in the locomotive fleet of JSC "Uzbekistan Railways" have reached the end of their service life, and worst of all, this figure is growing from year to year [5].Determining the residual service life of the main frame of shunting locomotives is carried out by diagnostics. In the process of diagnostics, the inspection is carried out without damage (nerazrushayushchiy control) and in the case of disassembly of the main frame of the locomotive.Since the shunting locomotives did not run at full capacity during operation, the residual resource can be considered incomplete. The experience of foreign countries shows that the actual service life of the traction rolling stock exceeds the time specified by the manufacturer. The safe operation of shunting locomotives includes legal, methodological and technical aspects [6].

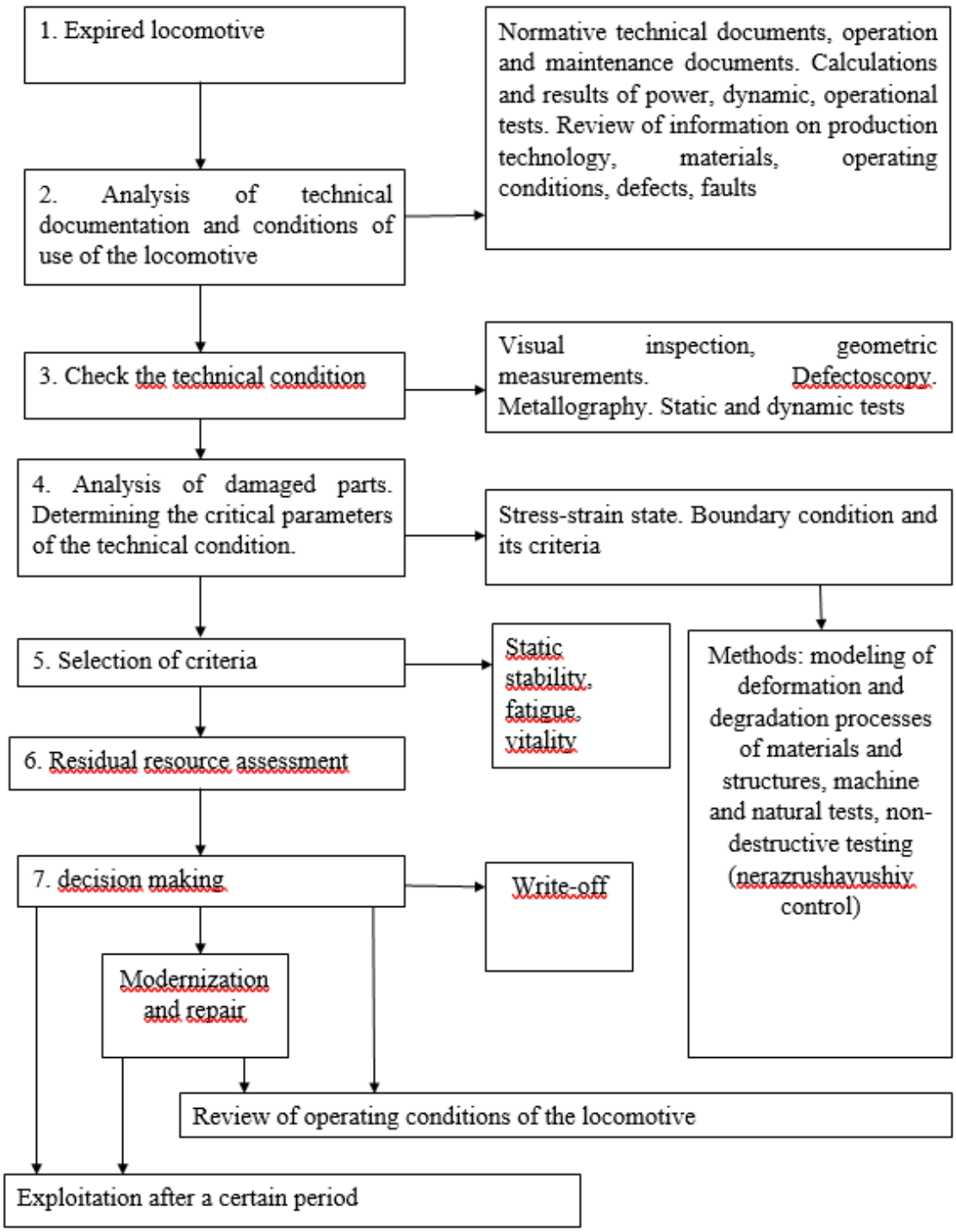
**DISCUSSION AND RESULTS:**

During the overhaul of locomotives, most units and spare parts will be repaired and replaced with new ones. As a result of the overhaul, the performance of the traction rolling stock is restored to a certain extent and the

efficiency of the traction parameters is increased.But the part that determines the condition of the residual service life of locomotives is the main frame design of this locomotive.According to the technical condition of the main frame structure of the locomotive, the period after the service life specified by the manufacturer is determined, ie the residual service life.The main frame of the locomotive consists of a metal structure and is subject to the following vertical, traction, friction and braking forces during operation. During operation, the main frame structure of the locomotive must ensure reliability, functionality and traffic safety in accordance with the requirements of the rules of technical operation.JSC "Uzbekistan Railways" allows you to bring economic benefits to the locomotive industry from these locomotives by assessing the residual service life of shunting locomotives in the locomotive industry and extending their service life, and through this economic efficiency to renew the locomotive fleet for a certain year.

**RESULT**On the basis of normative technical documents, the residual service life of locomotives that have reached the end of their service life and the extension of the residual service life are carried out in the following order:

**L Procedure for determining the residual service life of locomotives and extending the residual service life**



**Conclusion:** JSC "Uzbekistan Railways" will gradually modernize the locomotive fleet by determining the residual service life of each of the main frames of locomotives in the locomotive fleet on the basis of diagnostics, experimental results and extending the service life.

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