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ANALYSIS OF THE TECHNICAL CONDITION OF THE WEIGHT CHECKING WAGON TYPE 640-VPV-277 OF THE JOINT STOCK COMPANY "UZBEKISTON TEMIR YULLARI"

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Abstract– In this article, the assessments of the technical condition of the metal structure of the weighing wagon 640-VPV-277 were studied. When wagon carrying out calculations of the metal structure of a weight-checking wagon, the wall thickness will be taken taking into account its decrease by the average wear value to determine whether the strength of the wagon structure complies with the required standards.

Key words– Freight wagon, six-axle wagon, railway pivot beam, end beam, longitudinal beam.

I INTRODUCTION

One of the main conditions for the gradual development of the railway transport of the independent Republic of Uzbekistan is the renewal and replenishment of the fleet of freight and passenger wagons with modern domestically produced wagons that meet international standards, as well as extending the service life of existing wagons for their optimal use in operation [1-3].

In order to increase the efficiency and volume of rail freight transportation in the absence of other ways to increase the throughput and wagon carrying capacity of wagon-intensive sections, as well as with limited lengths of receiving and departure tracks at stations, the most promising is the introduction of wagons with heavy axle loads [4]. In this case, to determine the weight of the rolling stock in the railway industry of the republic, weight-checking wagons used for periodic checks should be operated.

Mechanized checking of all types of wagon scales that require periodic checks is provided by weight checking wagons. The weighing wagon performs mechanized verification of various types of wagon scales, thereby ensuring the accuracy and fidelity of the readings of weight measuring instruments.

At the moment, it is required to design and manufacture new and modernized weighing wagons to replace the old ones with an expired service life, but this takes a lot of time. In other words, before the release of new models of weighing wagons, as well as to achieve optimal performance indicators for currently used wagons, it is required to increase their service life. Increasing the service life of these wagons requires an assessment of the current technical condition and residual resources of these wagons [5-6].

At the first stage of the analysis of the technical condition of the metal structures of the 640-VPV-277 weighing wagons, it is necessary to identify faults that affect their service life by visual inspection.

At the second stage of the analysis, it is necessary to determine the wear values for the elements of the metal structure of the 640-VPV-277 weighing wagon for comparison with standard indicators and taking them into account when conducting strength studies.

For this purpose, a survey and analysis of the main load-bearing elements and structural parameters of the bodies of weighing wagons 640-VPV-277 was wagon carried out.

The weighing wagon model 640-VPV-277, located at regional railway junction Karshi, was built in 1966. The date of the last depot repair is 28.10.11. The weight of the wagon is 126 tons.

When checking the bodies from the outside, it was determined that there was corrosion on the side wall skins under a layer of paint. In this case, it is required to clean the bodies of the existing paint and weld the rust spots with new sheets. In the end walls and pillars of the body as a whole, there are no serious defects.

Welds of studs to side wall skins and welds from cross beam to stud welds need to be checked and re-welded.

During the inspection inside the weighing wagons, it was

revealed that the wooden floor needs to be completely replaced, the monorail (I-beam) needs to be repaired.

It is necessary to restore the supporting part of the monorail by applying corner No. 50. Due to wear, it is necessary to replace the rollers of the bogie hoist inside the wagon.

The metal plates of the weighing wagon model 640-VPV-277 in the area of the junction of the transverse beams with the center beam are destroyed by corrosion. At the time of inspection, the thickness of the metal lining is thirty percent of the nominal. It is necessary to install wear-resistant pads on the sides of the bogies of weighing wagons.

A survey of the technical condition of the main load-bearing elements and structural parameters of the body of this weighing wagon was wagon carried out. The measurement results are shown in figures (8–12).

II Methods

Prior to determining the wear values of the body elements of the weighing wagon 640-VPV-277, schemes of measurement sites were drawn up, shown in Figures (1-7).

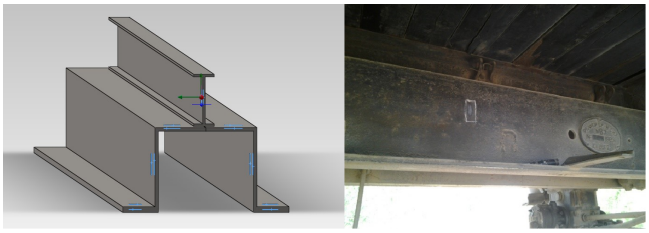


Fig. 1: Measurement of the center beam of the frame of the weighing wagon 640-VPV-277

Beam measurements were performed by the experimental method [7].

Based on the results of measurements of wear thickness h^i, the value of the average thickness h^i_{cp} is calculated taking into account the tolerance "δ=0.2 mm" for cleaning, which is determined by the formula

$$H^i_{mid} = \frac{1}{n} H^i_{mid} - 0,2$$

where n - the number of measurements.

Let us determine the average value of wear of sheets for the elements of metal structures of the weighing wagon according to the formula:

$$H_{mid} = \frac{1}{n} \sum_{i}^{n} H^i_{mid}$$

The results of the average wear values for the beams of the weighing wagon are summarized in figure 12.

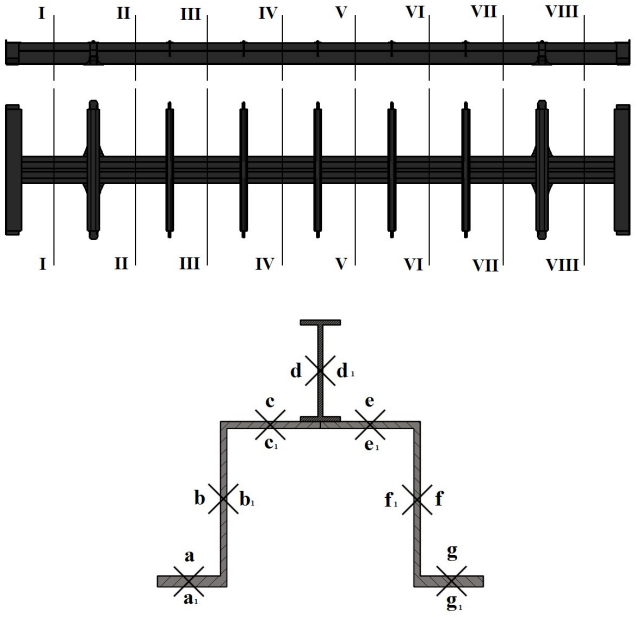


Fig. 2: Scheme of measuring the thickness of wear sheets on the center beam of the frame of the weighing wagon

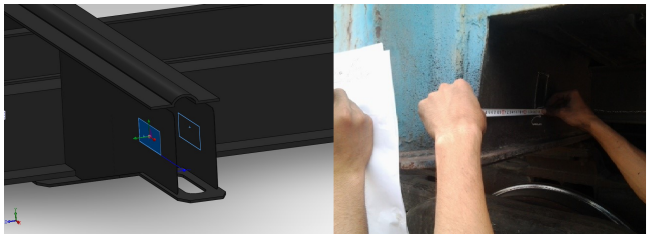


Fig. 3: Measurement of the pivot beam of the frame of the weighing wagon 640-VPV-277

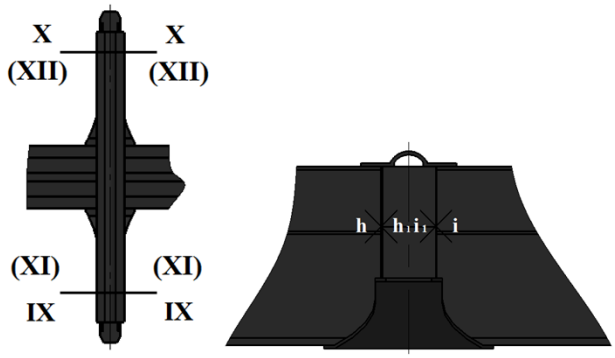


Fig. 4: Scheme of measuring the thickness of wear sheets on the pivot beam of the frame of the weighing wagon

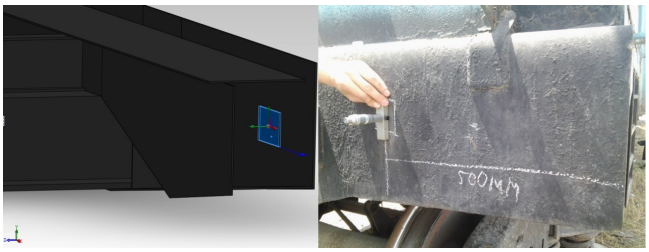


Fig. 5: Measurement of the end beam of the weighing wagon frame

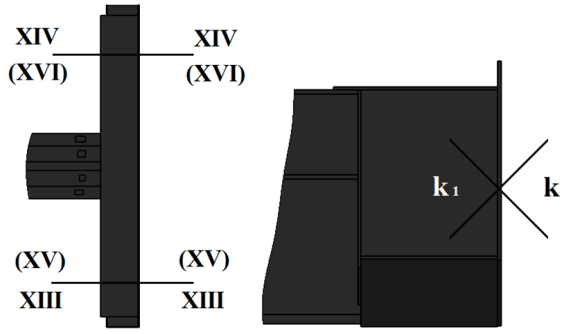


Fig. 6: Scheme of measuring the thickness of wear sheets on the end beam of the frame of the weighing wagon

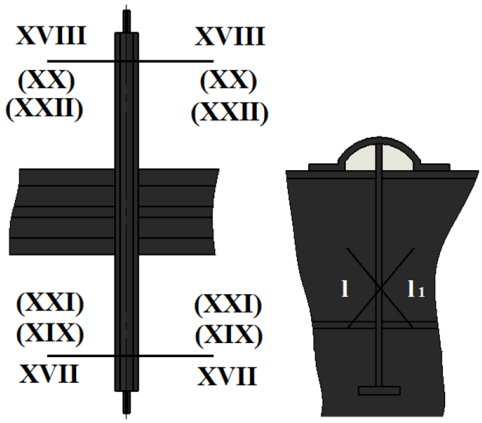
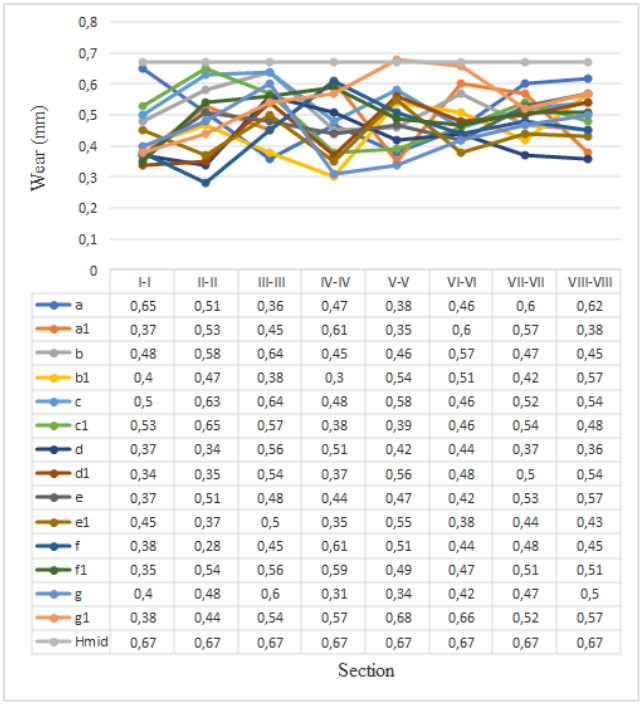


Fig. 7: Scheme of measuring the thickness of wear sheets on the longitudinal beam of the frame of the weighing wagon

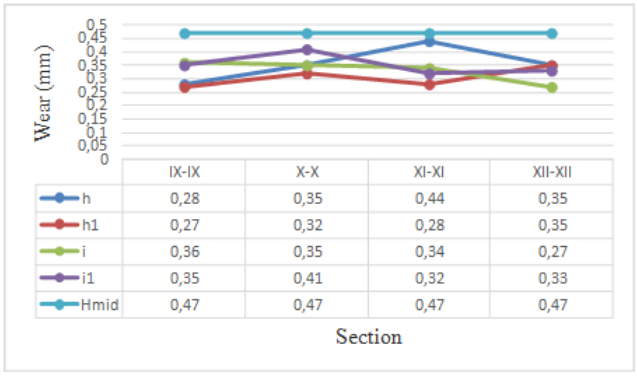
III Analysis of the results

At the analysis stage, it is necessary to determine the wear values for the elements of the metal structure of weighing wagons for comparison with standard indicators and taking them into account when conducting strength studies [8-9].



	I-I	II-II	III-III	IV-IV	V-V	VI-VI	VII-VII	VIII-VIII
a	0,65	0,51	0,36	0,47	0,38	0,46	0,6	0,62
a1	0,37	0,53	0,45	0,61	0,35	0,6	0,57	0,38
b	0,48	0,58	0,64	0,45	0,46	0,57	0,47	0,45
b1	0,4	0,47	0,38	0,3	0,54	0,51	0,42	0,57
c	0,5	0,63	0,64	0,48	0,58	0,46	0,52	0,54
c1	0,53	0,65	0,57	0,38	0,39	0,46	0,54	0,48
d	0,37	0,34	0,56	0,51	0,42	0,44	0,37	0,36
d1	0,34	0,35	0,54	0,37	0,56	0,48	0,5	0,54
e	0,37	0,51	0,48	0,44	0,47	0,42	0,53	0,57
e1	0,45	0,37	0,5	0,35	0,55	0,38	0,44	0,43
f	0,38	0,28	0,45	0,61	0,51	0,44	0,48	0,45
f1	0,35	0,54	0,56	0,59	0,49	0,47	0,51	0,51
g	0,4	0,48	0,6	0,31	0,34	0,42	0,47	0,5
g1	0,38	0,44	0,54	0,57	0,68	0,66	0,52	0,57
Hmid	0,67	0,67	0,67	0,67	0,67	0,67	0,67	0,67

Fig. 8: The results of measurements of the wear thickness of sheets on the center beam of the frame of the weighing wagon



	IX-IX	X-X	XI-XI	XII-XII
h	0,28	0,35	0,44	0,35
h1	0,27	0,32	0,28	0,35
i	0,36	0,35	0,34	0,27
i1	0,35	0,41	0,32	0,33
Hmid	0,47	0,47	0,47	0,47

Fig. 9: The results of measuring the wear thickness of sheets on the pivot beam of the frame of the weighing wagon

IV Conclusions

In the future, when calculating the strength of the mechanical parts of weighing wagons, it is required to take the wall thickness, taking into account its reduction by the value of the average wear indicators [10]. In other words, the value of the average wear must be subtracted from the value of the element sheet thickness. At the same time, it will be possible to find out whether the structural loading strength of the weight-checking wagon 640-VPV-277 is sufficient with the existing load wear required by the standards.

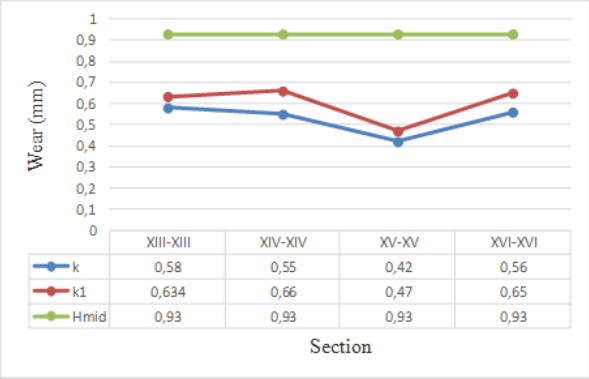


Fig. 10: The results of measuring the wear thickness of sheets on the end beam of the frame of the weighing wagon

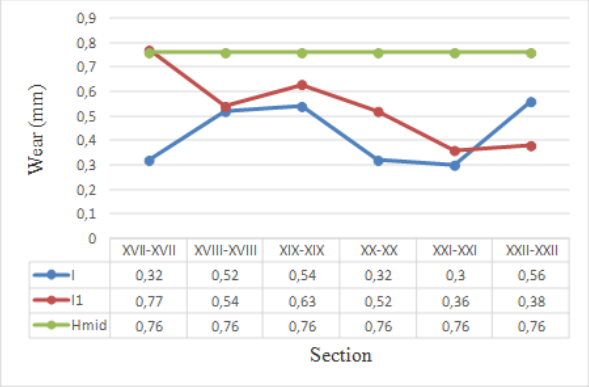


Fig. 11: The results of measurements of the wear thickness of sheets on the longitudinal beam of the frame of the weighing wagon

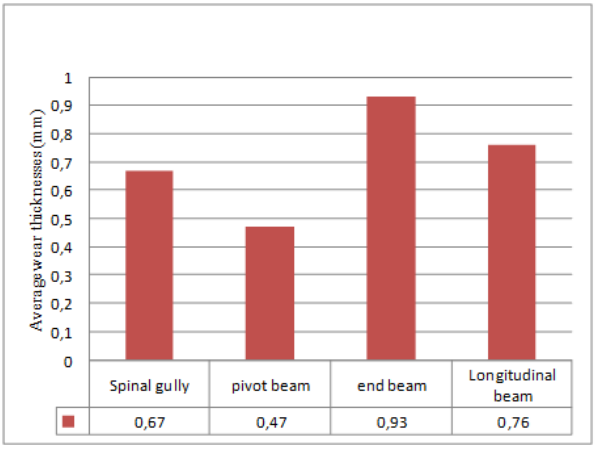


Fig. 12: The results of the average wear thicknesses for the elements of the weighing wagon 640-VPV-277

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