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ELIMINATION OF IMPULSE IRREGULARITIES ON THE RAIL HEAD WITH THE HELP OF GRINDING

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ABSTRACT

In this article, the analysis of intensity of the pulse roughness's arising on a surface of rolling of heads of rails on a site of high-speed movement of trains is carried out. Rail grinding technologies in the conditions of the railway track, which allowed to form technical and technological solutions, the introduction of which makes a significant contribution to the development of the railway industry and the economy of the country as a whole by improving the efficiency of operation, maintenance and repair of the railway track by ensuring the quality of rail profiling.

Keywords: Rail, pulse irregularities, measure, indicator, pilot area.

INTRODUCTION

Durability of rails, driving comfort and high-speed trains, the rolling stock is largely related to the condition of the running surface of the rail heads. In the course of movement of trains on a surface of rails there are either local, or extended roughnesses (wave-like deformation of rails). According to the accepted classification of rail defects NTD CP-2-93 the most significant are:

- undulating deformation of the rail head (defect 40);
- crumpling and vertical wear of the head (defects 41.1-2);
- lateral wear of the head in excess of the available standards (defect 44).

LITERATURE REVIEW

Undulating wear of the rails (defect 40) causes intense noise, impairs the smoothness of the train and reduces the service life of the elements of the upper structure of the track and the running gear of the rolling stock. It manifests itself as periodic irregularities on the rail head. The occurrence and development of wavy wear are the result of many factors, so there can be no single means to eliminate it. In the presence of initial wave-like defects (on new rails) in the process of dynamic effects during the movement of trains there are further development of the defect, the

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formation of wave-like irregularities (long waves) with an increase in their amplitude. The wave irregularities on the rail head are essential. Their origin and development are connected both with the technology of production of rails, and with the conditions and nature of their work under moving load [1].

DISCUSSION

For reliable detection of differently oriented internal defects of rails in the flaw detector several methods of ultrasonic testing are implemented, below are signs of detection of defects and corresponding channels of continuous control of both rail threads. This article deals with the local irregularities of the surface of the rolling head of the rails arising in the areas of high-speed and high-speed movement of trains of JSC "Oʻzbekistan Temir Yoʻllari". At the same time, the so-called "impulse irregularities" (hereinafter referred to as in) are considered, which are measured and evaluated by the track measuring car №. 106 of the track management Department.

To study the presence, intensity and dynamics of IN accumulation randomly within the Tashkent-Samarkand line.

In accordance with the developed research methodology, at the first stage, the presence and intensity of IN is assessed at the experimental sites. Subsequently, it is planned to study the possible causes of IN, to develop recommendations for their elimination and prevention.

RESULTS

For the initial assessment of the condition of the rail heads in the experimental sections, the results of track measurements by track measuring car №. 106 of March 3, 2019 were used. After that, to assess the condition of the rail heads in the experimental sections, the results of track measurements by the track measuring car №. 106 of September 18, 2019 were used.

The main indicators of the state of the rail heads in the experimental sections by the presence and intensity of IN are presented in table. 1, 2.

Table 1.The number of pulse irregularities in the experimental area №1. 03.03.2019 year

Km	Number of pulse irregularities							
	Right thread with depth, mm				Left thread with depth, mm			
	to 1.0	from 1.0 to 2.0	from 2.0 to 3.0	more 3.0	to 1.0	from 1.0 to 2.0	from 2.0 to 3.0	more 3.0
3714	0	0	0	0	0	1	0	0
3715	0	0	0	0	1	3	1	0
3716	1	0	0	0	0	2	2	1

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3717	0	0	0	0	1	1	0	0
3718	0	0	1	0	0	2	1	1
3719	0	0	0	0	0	0	0	0
3720	0	0	0	0	1	2	0	0
3721	0	0	0	0	0	8	1	0
3722	0	0	0	0	1	2	1	0

For picture 1, 2 and 3 presents a graphical interpretation of the number of pulse irregularities on the rails of the experimental sections. Thus it is possible to state that on the left rail thread on all experimental sites the number of impulse roughnesses is more than on the right rail thread.

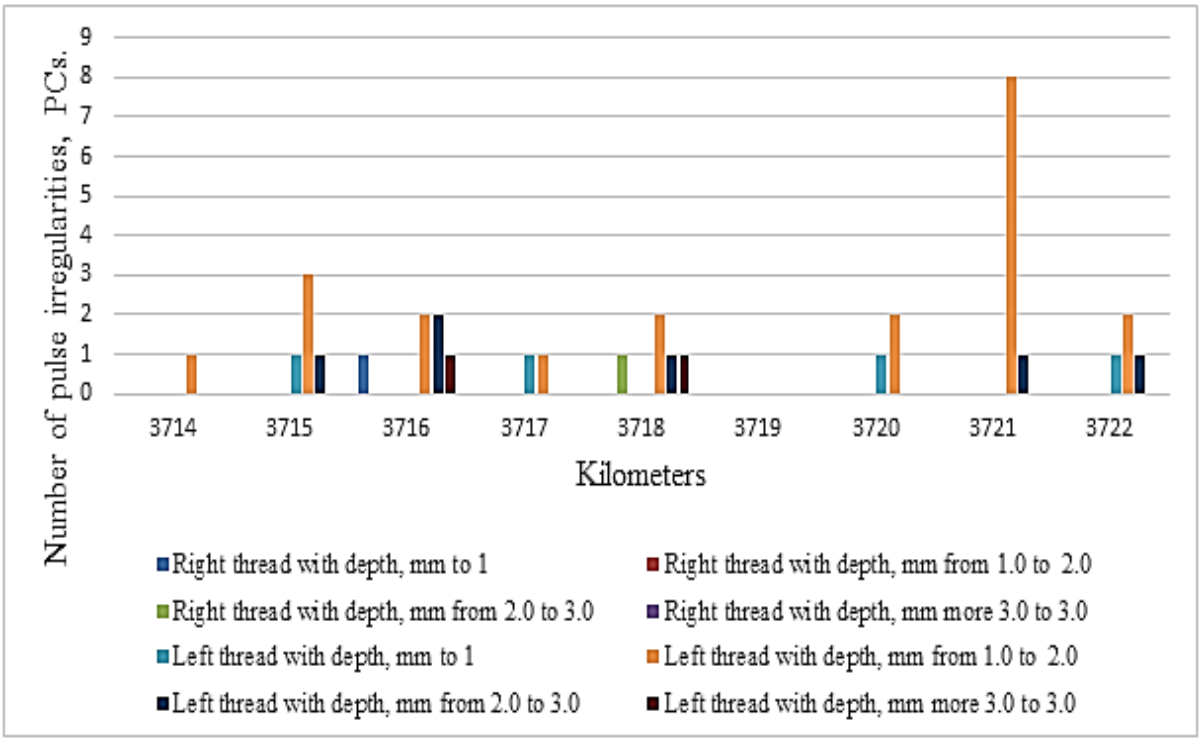


Figure 1. The number of pulse irregularities in the experimental site number 1 [2].

Table 2.The number of pulse irregularities in the experimental area №1. 18.09.2019 year

Km	Number of pulse irregularities							
	Right thread with depth, mm				Left thread with depth, mm			
	to 1.0	from 1.0 to 2.0	from 2.0 to 3.0	more 3.0	to 1.0	from 1.0 to 2.0	from 2.0 to 3.0	more 3.0
3714	0	1	0	0	0	1	1	0
3715	0	1	0	0	0	2	3	1
3716	0	0	1	0	0	2	2	1
3717	0	1	0	0	1	0	1	0
3718	0	0	0	1	0	3	2	2
3719	0	1	0	0	1	1	0	0

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3720	0	1	0	0	1	2	0	0
3721	0	1	0	0	0	8	1	0
3722	0	1	0	0	1	2	1	0

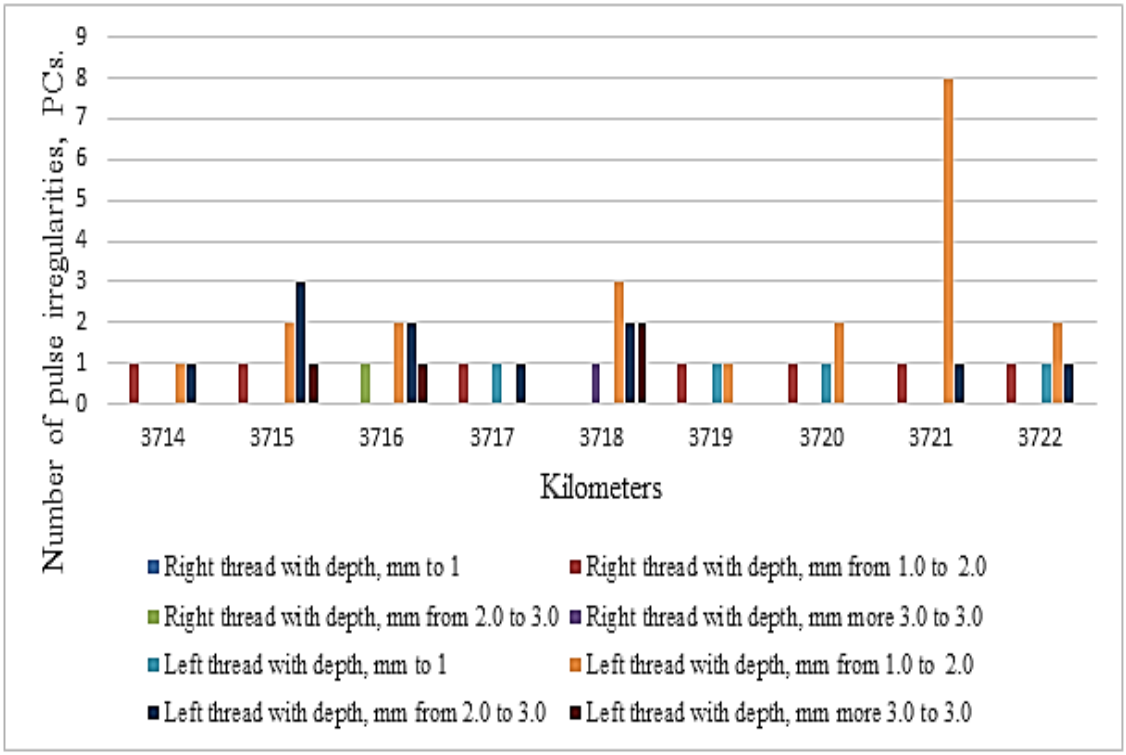


Figure 2. The number of pulse irregularities in the experimental site number 1.

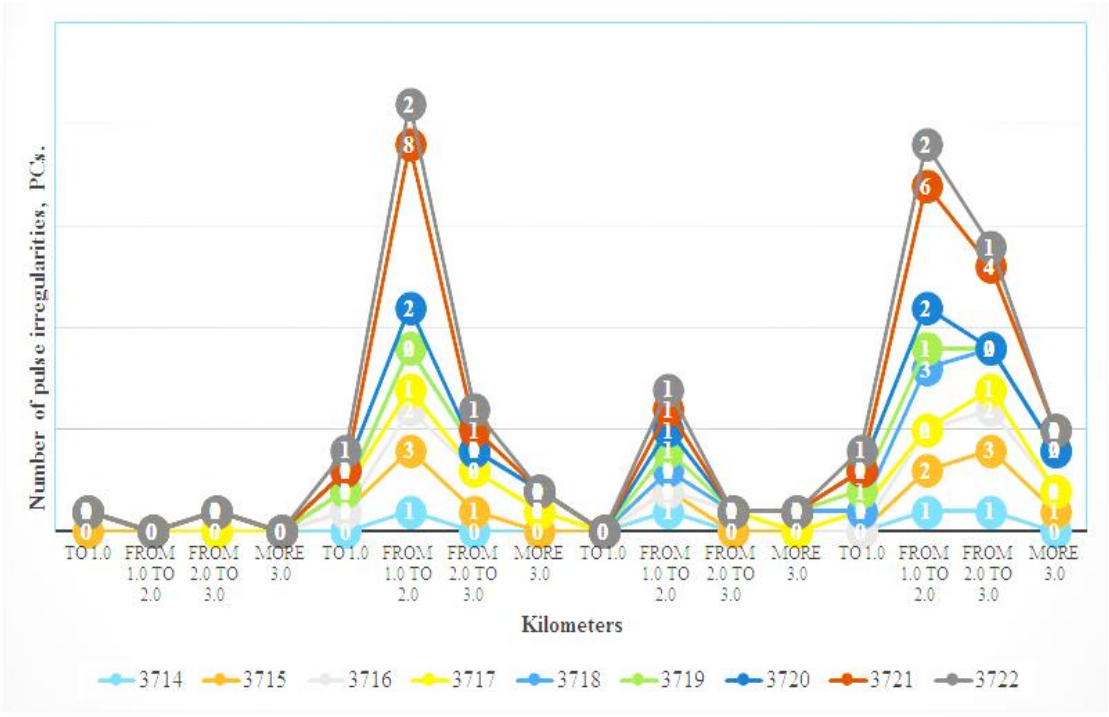


Figure 3. The number of pulse irregularities in the experimental site number 1.

The rail condition indicators are shown in table 3. At the same time, it can be noted that the intensity of pulse irregularities for all experimental sections differs

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significantly for the left and right rails. This fact requires additional study with the analysis of the state of the surface of the rolling rails directly at the full-scale survey of the rails of the experimental sites.

Table 3. Indicator of the state of the rails by the presence of impulse irregularities

Number of tests at the test site	Rail condition indicator at pilot site № 1		
	the left rail	right rail	two rails
03.03.2019 year	9,00	0,40	4,70
18.09.2019 year	11,88	2,63	7,26

As follows from tables 1-2 the number and intensity of the manifestation of impulse irregularities associated with the speeds of trains on the experimental site. Despite the lowest missed tonnage on the rails of the experimental section 1, the intensity of the manifestation of impulse irregularities as of 18.09.2019 significantly exceeds the same indicator for other experimental sites [3].

The running surface of the rail heads in areas of high-speed trains is observed the formation of impulsnykh irregularities, which are fixed measuring system puteizmeritelny car №. 106 and the number of pulse irregularities are unevenly distributed along the path and adversely affecting the structural condition of road and rolling stock. To do this, it is necessary to grind the head of the rails of the railway track.

Based on many years of experience, German railwaymen argue that grinding rails can seriously extend the service life of metal elements of the railway web. In addition, the search is still ongoing for the grade of rail steel that will require the least frequent grinding, which will reduce the running costs of both workers and the life cycle of the rails.

CONCLUSION

Experience suggests that the damage in its most part do not arise from the actual contact of the wheel and rails, but due to the rocking of the train left and right in the direction of movement. As a result, there are dents and mesh cracks. Scientists aim to increase the operational life of the rails to 40-45 years.

In railways the following variants of grinding of steel rails are accepted:

✓ primary treatment of newly commissioned tracks;

✓ periodic grinding operations on lines where rolling stock runs at speeds exceeding 250 km / h;

✓ periodic processing of suburban railways of the most intensive train traffic;

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✓ periodic processing of curves with the most significant radius, which are in the register of the basic part of the railways;

✓ grinding work required as needed.

Rail grinding technologies in the conditions of the railway track, which allowed to form technical and technological solutions, the introduction of which makes a significant contribution to the development of the railway industry and the economy of the country as a whole by improving the efficiency of operation, maintenance and repair of the railway track by ensuring the quality of rail profiling.

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