Research on Improvement of Maintenance Quality of Common Speed Railway Public Works Based on Computer Maintenance Technology

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Abstract. With the rapid development of transportation technology, the application of railway transportation is more and more widely, which has become an important livelihood project. Therefore, we need the railway department to continuously strengthen the maintenance work of Railway public Works (hereinafter referred to as RPW) technology. Compared with the operation efficiency of railway, the operation efficiency of common speed line is higher, which requires us to strengthen and improve the maintenance management of common speed line. Through computer technology, the railway department can fully implement the mode of "maintenance and repair", which will avoid the current situation of high wear and tear of heavy haul railway. By gradually improving the maintenance level, we can improve the equipment support ability, which has a certain promotion value for the railway line workshop maintenance. First of all, this paper analyzes the key points of RPW maintenance, and then, this paper analyzes the construction of comprehensive data platform of RPW maintenance plan. Finally, some suggestions are put forward.

Keywords: Computer Maintenance Technology, Railway Public Works, Common Speed Line, Maintenance Quality

1. Introduction

RPW are exposed to the air, which will be affected by natural conditions, such as rain, snow, sand, acid rain and other bad weather. At the same time, the railway transportation will be affected by many aspects, such as temperature, humidity, external force impact and overuse, which leads to the need for continuous maintenance of the railway state [1]. Therefore, the railway department needs to constantly improve the quality of maintenance, which will improve the efficiency and quality of railway transportation. Through the computer maintenance technology, the railway department can ensure the operation speed, which will comprehensively improve the traditional inspection technology [2]. At present, China's line maintenance is a three-level operation management mode, including the Ministry of railways, railway administration, and grass-roots stations and depots [3]. Therefore, the maintenance organization form of the line is mainly responsible for the comprehensive line maintenance work by the mechanical and chemical team or the road maintenance work area. Through railway line maintenance, we can ensure the stability of track geometry, comfortable operation service.
and safe transportation environment. Therefore, the RPW department needs to carry out the investigation and maintenance of railway line equipment in time, which will effectively avoid the occurrence of equipment failure [4-6].

2. Key contents of maintenance of common speed railway line

2.1. Track maintenance
In the track maintenance work, we need to do a good job in the maintenance of the turnout and its front and rear lines, which is one of the keys to ensure the smooth operation of the train. There are often problems between the turnout area and the track direction of the front and rear lines, such as poor connection, uneven straight direction, side bending of straight stock rail, poor bending size of curved stock rail, poor turnout frame size, incorrect frog position and unsmooth guide curve [7]. Rail defects increase the impact of locomotives and vehicles on turnout track structure, which will cause rail displacement. Therefore, serious line disease may develop into equipment failure. In the daily maintenance work, we need to do a good job in the renovation of track diseases, which is an important maintenance content to ensure the stability of the line [8].

2.2. Rail joint maintenance
Rail joint is one of the weak links of railway. The discontinuity of rail surface at the joint increases the driving resistance, which can reach 25%. Therefore, rail joint maintenance can cause a variety of joint diseases, which needs to increase the investment of line maintenance cost. Under the impact of long-term operation, the friction between ballast and ballast will produce powder, which will cause daily environmental impurities. Therefore, a variety of diseases often appear in rail joints, such as track bed hardening, frost boiling and loss of elasticity, low joint, joint empty hanging plate, action edge error and rail top height difference. At the same time, if the joint is not repaired seasonally in time, the joint rail gap will not be within the scope of the design rail gap [9].

2.3. Curve maintenance
Curve is a weak point in maintenance work. Daily operation of the curve maintenance is less, which will cause the curve on both sides of the straight part of the direction is not straight, not smooth, curve head and tail bending, goose head and so on. In train operation, the impact of curve will make the whole length of curve longer or shorter. Therefore, we need to strengthen the inspection and analysis of the curve, which can analyze the amplitude diagram of the track inspection car. Therefore, we need field measurement, which can organize personnel to correct the curve. We need to strengthen the renovation of the line in the period of freezing up and falling down, which will avoid too large track distortion and threaten the safety of the line. Reasonable curve setting will eliminate the irregularity of the curve part, and the gauge change rate will be controlled within 2 ‰, which can reduce the uneven wear of rail by vehicles. Therefore, railway maintenance needs to strengthen the renovation of curve defects and geometric dimensions. We can slow down the wear rate by oiling. Daily, railway maintenance needs to do a good job in parts renovation, which can adjust the gauge on both sides of the track slope ratio and small radius curve stability. Vertical curve is easy to ignore in daily maintenance. The incorrect position of vertical curve will make the vertical curve position offset, linear change and so on, which will cause serious overrun of grade change rate [10].

2.4. Line crossing
The fork of the line is one of the key points of common speed railway line maintenance, because the fork of the line connects multiple lines at the same time. The position of the fork is very important in the railway line. At the same time, there are many Turnouts on the line, which will cause a very complex structure. Therefore, we need to carry out regular maintenance, which will greatly increase the service life. In the process of railway development, we need to focus on the inspection of common speed railway line fork [11].
3. Construction of comprehensive data platform for RPW maintenance plan

3.1. Design of integrated data platform
Data is the basis of accurately grasping the track quality status, which is an important basis for the public works Department to make maintenance plans. Through computer technology, we can use the detection data to establish the track state analysis model, which can analyze the change trend of track geometry. Through computer technology, we can find out the key section and deterioration period of the line. Therefore, the RPW department needs to accumulate various test data, maintenance data, equipment account data, etc. Through in-depth analysis of all kinds of data, we can find out the internal relationship between the data.

3.2. System software architecture
The business system can adopt B / s four tier architecture, and the maintenance system can adopt C / S architecture. The software architecture is shown in Figure 1.

![System software architecture](image_url)

**Figure 1.** System software architecture.

3.3. Test data
Lines, bridges and tunnels, subgrade and road maintenance machinery have their fixed detection methods, which can reflect a certain state of the equipment. The classification of line detection methods is shown in Figure 2.

![Classification of line detection methods](image_url)

**Figure 2.** Classification of line detection methods.

3.4. Characteristics of track maintenance data
Mass data will be generated in the daily production process of Public Works Department. Therefore, it is necessary to accurately grasp the track quality status of RPW. By making maintenance plan
scientifically, we can accumulate a lot of historical data. The process of data extraction, cleaning and conversion is shown in Figure 3.

![Flow chart of data extraction, cleaning and conversion.](image)

### Figure 3. Flow chart of data extraction, cleaning and conversion.

#### 4. Measures to improve the quality of RPW maintenance

##### 4.1. Change the existing maintenance awareness

In 2015, China's railway has been in the nationwide repair and maintenance work. Therefore, the quality of the national railway needs to be improved, which requires the railway department to carry out the idea of comprehensively improving public works. RPW departments need to accumulate maintenance work experience, which can sum up the daily maintenance work. At the same time, the maintenance work of RPW needs to be deeply reformed, which requires the workshop of RPW to re-perfect the management system. Therefore, railway maintenance staff need to be trained, which can integrate the staff. At the same time, we can set up a team of railway turnouts, welding repair and inspection workers, which will ensure the quality of railway construction and maintenance. By improving the maintenance system, China's railway maintenance can improve the quality and efficiency. At the same time, employees can increase enthusiasm, which will ensure the effect of maintenance work.

##### 4.2. In depth analysis of maintenance data

Based on computer technology, RPW can deeply analyze maintenance data. First of all, the daily maintenance data should be recorded by RPW. In the daily inspection work, the section acceptance group should inspect the RPW, which also needs to record the inspection data. Therefore, the data processing department should deeply analyze these data. By analyzing the causes of the problem, we can work out the corresponding solutions according to the data. At the same time, the RPW should organize the staff to repair the problem location, which can ensure that the railway is in a good running state. Second, the RPW should strictly inspect the railway lines. The staff of the technical department should check the railway line regularly, which also needs to analyze the test data. Through the development of targeted programs, RPW can carry out maintenance and maintenance. Using some advanced intelligent software, railway maintenance can process and analyze the collected data, which will quickly analyze the causes of data damage.
5. Conclusion
In the routine track maintenance, we must strengthen the quality of inspection and maintenance. Through computer technology, we can improve the in-depth analysis of data, which can be more scientific to find the relationship between various maintenance. Through continuous improvement, RPW can ensure the safety of the line, which can ensure the safety of railway operation.

References
[1] An Gensheng. Analysis on common problems and Countermeasures of RPW maintenance [J]. Management and technology of small and medium-sized enterprises (last ten days), 2017 (02): 192-193.
[2] He Yang, Liu Mingliang, Chen Ronghuai, Zhao Wenfang, Li Yuanfu. Research on division method of railway maintenance management unit [J]. Railway standard design, 2016,60 (11): 14-18.
[3] Huang Liangzhong. Problems and Optimization Countermeasures of RPW vehicle operation and management [J]. Management and technology of small and medium sized enterprises (next issue), 2019 (12): 8-9.
[4] Kang Gaoliang, Chen Dongsheng, Li Guoqing, Tian Xinyu, Qu Jianjun. Research on maintenance management system of China's high speed railway [J]. Railway technology innovation, 2015 (02): 113-116.
[5] Li Weihan. Comprehensive analysis and application of railway line inspection data [J]. Value engineering, 2019,38 (14): 169-172.
[6] Lu Xiangguo. Analysis on common problems and Countermeasures of RPW maintenance [J]. Theoretical research on urban construction (electronic version), 2017 (09): 232-233.
[7] Si Jidong. Measures to improve the maintenance quality of RPW common speed lines [J]. Green environmental protection building materials, 2019 (07): 103-104.
[8] Wang weipeng. Analysis on common problems and Countermeasures of RPW maintenance [J]. Technological innovation and application, 2017 (12): 229.
[9] Wang Xiaochen. Measures to improve the maintenance quality of common speed railway lines [J]. Theoretical research on urban construction (electronic version), 2019 (13): 133.
[10] Zhang Haibo. Analysis on common problems and Countermeasures of track maintenance of common speed railway [J]. Heilongjiang Science and technology information, 2016 (20): 218.
[11] Zhang Tao, Li Zhouqiang. Application of comprehensive detection technology in RPW safety production [J]. Railway technology innovation, 2017 (02): 51-54.