Design of a Circular Blade Cleaning Device for the Filter Rod of YJ212 Cigarette Machine

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Abstract. The ZJ112 type Cigarette machine is a home-made type of PROTOS 90E. When the equipment is running, the filter rod of the filter rod is often deposited with glue, which causes the overloading of the drive motor of the circular blade and the transmission of the transmission gear shaft and so on, which seriously affects the efficiency of the equipment. By designing an automatic cleaning device to clean up the adhesive on the circular blade, it reduces the frequency of the circular blade glue accumulating, improves the stability of the equipment and effectively reduces the working strength of the equipment maintenance and maintenance.

Introduction

The ZJ112 type cigarette machine is a domestic medium speed machine introduced by Hangzhou cigarette factory in 2014. The theoretical production capacity can reach 10000 / minute (500 packets / minutes), and it is a domestically made model of PROTOS 90E. In the actual production process, the filter rod cutting drum device of the YJ212 filter nozzle is in one cycle (usually half a month). The cutting groove of the cutting drum and the blade are filled with scale. It needs to be cleaned frequently for the filter rod cutting drum and the circular blade, causing the loss of the preparation efficiency[1-2].

Existing Problems and Causes Analysis

The filter rod cutting device of YJ212 filter attachment is two of the standard filter rod. In the actual production process, the circular blade cutting motion to make the circular blade hot and make the circular blade hot. After long cutting the filter rod, the circular blade is filled with glue and the cutting groove of the cutting drum is filled with the glue scale, which causes the resistance of the circular blade and the inner groove of the cutting drum to increase, and it is very easy to cause the motor of the circular blade to burn out and drive the transmission gear. Once the motor is burnt out or the transmission gear is knocked out, the maintenance is extremely difficult. The maintenance time is long and the maintenance cost is high, which seriously affects the efficiency of equipment. Each blade for rubber product stuck fault after removing the drum cleaning maintenance takes about one hours. Statistics of the second half of 2017, team and workshop maintenance records, because of circular blade razor and motor burn out of a total of 6, the transmission gear was destroyed 2 times. In order to reduce the failure of this kind of equipment, the YJ212 filter holder needs to increase the cleaning times of the drum groove and cutting circular blade in a periodic cycle, and reduce the production efficiency of the equipment[3-5].
The operator manual cleaning frequency as shown in Figure 1 of the cutting blade.

As shown above, as the number of working days increases, the adhesive frequency of the circular blade surface area of the YJ212 filter nozzle is increasing. It needs the machine to use the equipment to stop the glue manually, especially when the equipment is running for 12 days, the cleaning frequency of the circular blade is 6 times, that is to say, the average per flight needs to be cleaned two times, not only increasing the workload of the stopper and reducing the production efficiency. It also greatly increases the risk of failure of the circular blade driving motor and the transmission gear's failure due to glue accumulation in the filter drum. It can be seen that filter cleaning for YJ212 filter attachment is a device problem that cannot be ignored.

YJ212 filter rod filter rod cutting circular blade motor speed 1400r/min, long and high speed cutting motion to make the circular blade heat, the filter stick glue, easy to melt, and adhere to the circular blade, cause the circular blade glue, cutting drum cutting groove is full of glue scale particles, thereby causing the circular blade and cutting drum inner groove resistance increases, cutting is not smooth, making circular blade [6]. It is fast enough to cause the transmission gear to be knocked off and the motor to overload.

**Improved Scheme Design**

The "Y" type elastic support scraper device is designed on the circular blade of the filter rod of the YJ212 filter nozzle. Using the structure space of the equipment, the clamping force to be considered is not too large. It mainly enables the inside and outside scrapers to stick the two sides of the circular blade to clean. The circular blade has high hardness and toughness and wear resistance. In view of its characteristics and maintenance cost and durability, the triangular ceramic blade on the lathe tool is selected to be installed on two elastic support feet of the "Y" elastic support scraper, 60 degree knife head, 360 degree rotatable, three face to be bad clean, and the excellent heat resistance, wear resistance and chemical stability of the ceramic blade. It has long service life and can effectively clean glue on the circular blade.

According to the structure of the equipment, the three cutting seat is designed as shown in figure 2 with the help of the filter bar. The left swing arm, as shown in figure 3, is shown in figure 4, as shown in figure 4.
Design related accessories: lock screw and screw, install and replace 60 degree ceramic blade. The left and right swinging arms are installed with a single location locking pin, the left and right arm arms are fastened, the spring screws are fastened, and the cylindrical pins of springs are fastened. The total entity effect diagram, as shown in figure 5.
1. seat 2. right swing arm 3. left swing arm 4. lock screw and screw 5. scraper 6. buckle spring pin 7. tension spring 8. one word positioning lock pin 9. tighten spring screw

Figure 5. Entity effect diagram.

**Improvement Effect**

The degree of glue deposition on the surface of the circular blade and the inner surface of the cutting drum is compared with that before and after improvement, as shown in figure 6. The assumption of the circular blade surface and cutting the severity of surface area of adhesive drum groove:

- The circular blade surface and the cutting drum groove surface of rubber product - level 0;
- The circular blade surface and the cutting drum groove surface of minor rubber product - level 1;
- The circular blade surface and the cutting drum groove surface moderate rubber product - level 2;
- The circular blade surface and the cutting drum groove surface serious rubber product - level 3.

![Figure 6. Comparison chart of YJ112 filter attachment assembly before and after improvement.](chart)

It can be seen from the figure that the surface area glue level of the improved front blade has reached 3 levels in twelfth days, and the equipment maintenance personnel must disassemble the filter rod cutting device in one cycles (2 weeks) for thorough cleaning. When the equipment runs to 28 days, the surface area of the circular blade surface and the cutting drum groove can reach the level of 3, and the equipment maintenance personnel can be in second wheels. During cycle protection, wheel cutting time is used to clean the circular blade cutting device thoroughly. It can be seen that the application of the automatic cleaning device can effectively reduce the daily work strength of the equipment operator and the maintenance personnel, improve the stability of the equipment, improve the production efficiency and improve the effect.
References


