Cypress-paper Cutting Parts Improvement of PROTOS70 Cigarette Making Machines

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Abstract. MAX cypress-paper cutting part is a key position in PROTOS70 cigarette making machines. In actual operation, it is often need to replace hob and paper cutting wheel, and cause cypress paper cutting quality defects such as cutting uneven, cypress paper incision burr. It is serious influenced of product quality and the efficiency of equipment. Therefore, based on the working principle of MAX cutting parts and analyzed cypress paper cutting quality defects, the hob body and gland was improved, with the o-rings, it was shorten the floating radial clearance of hob, reduced the impact and cushion, prolong the service life of hob. The paper incision defects number dropped from 97.5 to 57.8 per week, and the improvement effect is obvious.

Introduction

The MAX splicing part of the PROTOS 70 cigarette machine consists of two parts, the paper cutting wheel and the hob, and the splitting method is the rigid contact [1]. The bonding paper after gluing is cut into a certain length of the tipping paper by the cutting parts. After cutting the paper, the cigarette and filter are combined to form a double filter length cigarette. Then a qualified filter cigarette is produced after rubbing and cutting. The quality of the parting parts directly affects the quality of the paper and the quality of the filter, and it will also increase the maintenance cost of the hobbing cutter and reduce the effective operation rate of the device.

Existing Problems

As shown in Figure 1, the paper cutting device is the main part of the filter nozzle, which is mainly composed of the accessories of the hob, the tool holder, the cleaning brush and the paper cutting wheel. The main responsibility is to cut the adhesive paper into a uniform width of paper sheet for the pack of the smoke group. There are many small holes on the surface of the paper cutting wheel, which are connected with the vacuum pump. The negative pressure will absorb the tipping paper and drive the tipping paper movement, and transfer the paper. The cutting wheel and the hob cooperate to cut the coated paper into sheets, so as to supply the cigarette pack.

Tipping paper after the glue is then transferred to the paper cutting wheel by the suction air sucked, transferred to the next step by the joint effect of cutting wheel and hob will be tipping paper cut sheet, cutting method for rigid contact cutting, hob radial floating type cutting action, the cutter glue brush is not clean clear off in the process, to ensure the knife clean, prevent cutting when tipping paper stuck on the hob, so as to ensure the volume of cigarette quality after [2-4]. However, in the field of equipment operation, when the hobbing cutter is cutting and tipping, the tipping paper on the paper surface falls much more on the hob part, and often sees the phenomenon of continuous cutting and continuous cutting of the loaded paper, resulting in the frequent shutdown of the equipment, which seriously affects the efficiency of the equipment.

According to the related literature on the paper cutting defects, Xu Wenmin [5] analyzed the reasons why the ZJ112 cigarette making machine blocked the pipeline during the running process, and solved the clogging problem of the paper by improving the air duct of the paper suction device. Xie Binhua [6] improves the electrical logic control system to solve the problem of large air pressure in the paper cutting paper cleaning. Zhang Jie [7] analysys the solutions to the defects of PASSIM cigarette machine, which are connected with paper sheets and cut with hair slag. There is no report on the improvement of the PROTOS 70 splicing component.
In the process of using the cutter wheel continuously with cutting hob with cooperative action, because the cutting way for rigid extrusion cutting, easy to produce shades in the paper cutting wheel on the cutting knife, reduce the cutting wheel of life at the same time, the rigid cutting method will lead directly to all parts of the cutter wear and blunt, resulting in tipping paper cutting, tipping paper cutting defects generated. At this time, it is necessary to re adjust the cutting pressure of hob, and the pressure of the hobbing cutter and the cutting wheel will be increased after the reset. The cutting life of the hob is sharply shortened, and the hob blunt makes the hob parts replacement frequency high, and the replacement period is short, which increases the workload of the hob maintenance worker.

The main reason for the above analysis in the paper cutting wheel and the rigid cutting hob to produce the instantaneous impact, on the one hand may cause wear of the blade blunt, on the other hand will cause the cutting wheel has shades of the knife, the cutting way ranging from tipping paper cutting quality defects, while direct the damage of hob and cutting wheel of two major components, resulting in equipment downtime, reducing the effective utilization rate of equipment.

**Improvement Method**

The analysis shows that the decrease of hob radial floating, which has certain buffering and vibration absorption is the key to solve the quality defects of hob and prolong the service life of the hob, need to have certain buffer force considering the hob cutting, so the need to reduce the hob radial floating and rigid contact between the cutting wheel.

**Increase the O Type Ring**

As a kind of elastic material, O type ring has a certain effect of buffer and vibration absorption, and has the resistance to pressure and deformability of [8]. The increase of O ring in between the hob holder and the cover plate, the radial cutting moment of the floating range within 0.10mm, and prevent the cutter ends and uneven force to improve the stability of radial floating movement, and thus play a buffer role in cutting process, reduce the instant impact.

By measuring the original knife end diameter is 71.3mm, the rubber O ring selection table, select the diameter of type 69mm + 0.53, the diameter of choice, taking into account the end cap screw hole diameter (4.8mm diameter hole diameter 8mm depth 3.5mm), section width of 16mm limit, choose the cross section diameter of O ring 2.65mm + 0.09 of the better effect.

**Reassembly of the Hob Body and the Cap of the**[^9]

Due to the addition of the O type ring between the hob body and the gland, the original hob end face is directly contacted with the gland. According to the design and installation requirements, a
suitable circular groove can be opened on the two end face of the hob body. As shown in Figure 2, in order to ensure that the O type ring is installed, the end cover can be properly positioned and a semicircle arc slot with a radius of R1.3mm is opened at both ends of the hob. As shown in Figure 3, a circular arc groove with a radius of R1.3mm is also opened on the inner face of the cap to meet the installation requirements of the O ring.

Installation Method

Firstly, using the original method of hob will improve the level of crude to eight piece knife to cover the same circumference, reserved radial floating 0.10mm ~ 0.15mm, then replaced the improvement of flat gland change, the improved radius R1.3mm gland assembly, O type ring at both ends of the hob body were placed in the diameter of 69mm * 2.65mm the hob blade by the elastic positioning, radial floating was significantly reduced, and there is a buffer.

Application Effect Verification

Improved after a year long use, improvement effect is more prominent, tipping paper cutting device during operation, hob cutting pressure is relatively stable, knife cutting wheel is also less, cutting wheel replacement cycle of two months from the original extended to six months; hob replacement cycle from 240 hours about extended to 560 hours, hob cutting life prolong; tipping paper cutting incision after cutting of the hair, and other defects decreased significantly, from the supervision of daily report statistical control chart situation inspection, cigarette cut hair defects was significantly lower than that before the improvement, the number of defects from the 97.5 week decline to 57.8 the results, the improvement effect is obvious.
Reference


