

Manufacturing technology and application of hemp cigarette paper with dense ash integration

Yu Yao, Zhan Jian-bo, Wan Hao, Zhang Ying, Li Li-wei, Yu Jiang, Yu Ting-ting, Xie Jiao, Yue Bao-shan

R&D Centre, China Tobacco Yunnan Industrial Co., Ltd., Kunming, 650231, China
yuyao@ynzy-tobacco.com

Abstract. Cigarette paper, as one of the significant materials used for combustion, has special and direct influence on the smoke, also directly influencing the ash appearance of cigarettes before and after combustion. In this paper, full hemp cigarette paper was prepared through creative beating and mixing slurry technology, and the advantages of the preparation process were analyzed. Full hemp cigarette paper was creatively applied to the preparation and verification of slim cigarettes, and the ash integration effect in the process of burning and its influence on whiteness were verified. At the same time, the physical and chemical indexes of cigarette paper were tested and studied, and sensory evaluation was applied to verify the effect of cigarette paper on sensory quality.

1. Introduction

Cigarette paper, as an important part of materials applied in cigarettes, not only carries the key image and connotation of products, but also is involved in cigarette burning. Therefore it has special and direct effect on cigarette smoke[1]. On one hand, gas after combustion of the cigarette paper is an important component of cigarette smoke, so the cigarette paper plays an important role for smoking cigarette sensory burning; on the other hand, the inherent quality of cigarette paper will also affect the combustion status of cigarette [2].

Compared with coniferous wood, bamboo and broad-leaved trees and grasses, hemp fiber is quite different in aspects of fiber length, fiber aspect ratio and other parameters. The hemp fiber raw material contains high fiber content, good strength, small cell wall thickness and fiber wall to lumen ratio, and the fiber flexibility is good due to the smooth and soft fiber[3]. Hemp fiber cell cavity leads to fine fibre and appropriate transparency. However, it is easy to form the fiber wire brush, so the paper permeability is relatively low. Therefore, the hemp fiber is rather suitable for making high-grade paper and industrial paper, such as banknote paper, cigarette paper[4].

Slim cigarettes (17.0 mm) market has become one of the fastest growing markets in major markets such as South Korea, Eastern Europe and central Asia. In China, since 2010, the annual growth rate of cigarette smoking has been as high as 40%, which has become a new growth engine in the cigarette sales market. However, the slim cigarette is the circumference of 24.3mm normal cigarette specifications, resulting in combustion in cigarette paper weight percent, compared with the normal cigarette circumference 24.3mm specification 6.53%, slim cigarette with circumference of 17.0mm has significantly increased from 9.44% to 45%, affecting the sensory evaluation. Taste of cigarettes rise, but the harmony evaluation declines. Therefore, it is necessary to study a new type of cigarette paper, which is suitable for special specifications (22.30 mm)[5, 6].

A common problem is that the burning cone of slim cigarettes is longer, which is easy to fall off the combustion cone, resulting in safety risks to consumers. It is difficult to meet the technical



requirements of the slim cigarettes, and it is necessary to strengthen the ash content of cigarette paper. In addition, the sharp reduction of the circumference of the cigarette, the aroma of the slim cigarettes decreased a lot more than the normal cigarettes, causing impacts on cigarette paper.

Therefore, it is necessary to combine the general characteristics of cigarette paper and cigarettes, to develop the general package of cigarette paper with dense ash, and to study the method and path of enhancing the contribution of cigarette paper to the flavor of cigarette. According to the slim cigarette paper and general anesthesia, the ash density of cigarette paper was tested at the same time. Moreover, the slim cigarette paper prepared from chemical index, ash effect, sensory quality and other aspects were carried out for the application evaluation.

2. Experimental

2.1. Cigarette paper composition

Dense ash cigarette paper consists of general fiber pulp: 55-70%, packing: 25-40%, accelerant: 0.5-3%, ash coating agent 0.2-0.6%, the rest of water.

2.2. Preparation of cigarette paper samples

The preparation of cigarette paper mainly includes the following steps:

(1) Hemp pulp by hydropulper pulp, pulp concentration control in the range of 3-3.5%, breaking the water into the complete mixture in beating circulation, first through a large taper refiner of hemp pulp fibers were cut off;

(2) Preparation of slurry into two different beating degrees and wet weight of the pulp slurry. The slurry to a fiber cut short by way of beating, and the beating degree of control of 35-65 DEG SR, and the wet weight was about 16-18g. The beating degree control at 80-85 DEG SR, and the wet weight was about 6.5-8.5g;

(3) Prepared slurry is extracted according to the requirements of the quantitative and the air permeability of the paper, respectively;

(4) Filler mixture preparation, selection of liquid calcium carbonate mixed calcium carbonate crystal particle size between 0.15-0.5 μm and 6-8 μm two material size interval uniform for cigarette paper manufacture;

(5) Mixture of the slurry is prepared. The mixture is copied to the wet paper sheet by a long web paper machine;

(6) The press section of the vacuum roller is transferred for further dewatering;

(7) Transferred from the press section of wet paper into the pre drying section of the paper, the dryer is dried to constant water;

(8) Combustion and ash mixture solution is prepared: accelerant solution prepared by 0.5%-5% solution quality percentage according to requirements; 0.2%-1.5% solution quality percentage requirements ash solution;

(9) Prepared combustion and ash agent mixture into one side coated or double immersion were added to the cigarette paper sizing machine;

(10) Paper plate was rolled into required width.

According to the different components, 4 types of cigarette paper were prepared, which were numbered 1#, 2#, 3#, 4#.

3. Results and Discussion

3.1. Ash appearance

As can be seen from Fig. 1, there is obvious difference in the initial stage of combustion common cigarette paper and cigarette paper (4#) under general anesthesia in the combustion process and the effect of ash on the package, and this is possibly due to the initial stage of combustion. The slim cigarette ash characteristics can withstand the weight deviation after the combustion of soot in the combustion inclined; from 1/3 to 1/2 stage, with the gradual accumulation of soot length weight, a

common cigarette paper ash integrity began to appear, and the ash began to crack. The ash density declined seriously, and ash density of the general cigarette paper ensures the full package effect of ash. Common cigarette paper and cigarette paper burning in general anesthesia to the end: the difference shows that common cigarette paper ash density continues to decline, and the ash was grey. The general ash density performance is good, which can appear the whole ash, and the color is snow white, the ash appearance of new cigarette paper was significantly higher than that of ordinary cigarette paper.



Fig.1 Ash appearance of traditional (left) and hemp (right) cigarette paper at different combustion stages

3.2. Physical and chemical index detection during combustion process

Cigarette paper was made into 4 samples, and the cigarette combustion process associated with sensory quality was evaluated during determination of parameters, and the results are shown in Table 1.

Table 1 Physical and chemical testing results of different samples

Samples	Puff Number (puff/cig)	Tar (mg/cig)	Nicotine (mg/cig)	Humidity (mg/cig)	CO (mg/cig)	Tar correction (mg/cig)	CO correction (mg/cig)
1#	5.87	7.12	0.94	1.03	5.51	7.91	6.31
2#	5.47	7.87	0.83	0.98	6.32	8.70	7.11
3#	6.20	8.69	0.76	1.01	7.08	9.56	7.22
4#	6.02	8.74	0.96	0.91	8.12	9.61	8.15

Where, conditioning and testing atmospheric atmospheric pressure range of 80.5 kPa-81.5kPa, corrected formula: Tar $y = 1.046x + 0.468$, carbon monoxide $y = 0.986x + 0.880$.

As can be seen from Table 1, the relevant physicochemical parameters are in line with the requirements of mainstream smoke technology, but the high value of CO and tar, which may be mainly due to general anesthesia of cigarette paper in the preparation process of the ash results depending on the beating process, calcium carbonate additive quality control and process of comprehensive adjustment, the impact of cigarette paper the air permeability index, thereby affecting the CO value of the mainstream smoke and tar. From the point of view of the ash of cigarette paper, the more dense the cigarette paper, the better the ash content. However, it will also bring the difficulty of raising the air temperature. The problems such as CO and tar rise caused by the low permeability can be improved by the subsequent optimization of the preparation process, which can also be applied to the improvement of the process such as perforating paper.

By increasing the taper of the refiner, beating change cycle, the domestic first batch beating and then mixed into a slurry technology, which is a success as a breakthrough of hemp pulp technical problems. The utility model solves the problems that the pulp fiber is soft and long, and the pipe is easy to be blocked, and the paper defects such as the spot, the transparent point, the eye and the like

can be caused by the paper cutting. Cigarette paper produced by the present invention can effectively avoid the disadvantages of various ash appearance. Ash calcium carbonate results depend on the beating process, quality control and process of comprehensive adjustment and combination of additives. The ash coating components applies normal dosage, which has no obvious effect. The process could be accomplished with low manufacturing cost, and it does not cause changes in the cigarette sensory. Due to the focus on the ash appearance, such application may lead to the cigarette paper permeability increase limited.

4. Conclusions

(1) Applications of compact ash appearance of cigarette paper is feasible for general cigarette products, effectively solving the drawbacks caused by the smell of cigarette paper. To enhance the slim cigarette sensory experience, the quality of cigarette paper could be further improved.

(2) Aiming at the common problems that the burning cone is too long, and it is easy to fall off, the solution of cigarette paper is provided, which further eliminates the potential safety hazard of cigarette smoke.

(3) To obtain a dense balanced consideration of all aspects of cost, quality, ash and other requirements of the package of cigarette paper ash preparation technology, especially the first batch beating and then mixed into a improved technology. Combined application and its supporting process, cost advantages could break the foreign monopoly in the field.

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