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Application of energy-saving and emission-reducing feeding filter system

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Abstract: Feeding filter system is the main way of tobacco conveying between silk making workshop and rolling workshop. Feeding filter system is a form of material wind transmission. Due to the supply of multiple coiling equipment in a feeding filter system, the randomness of the supply of tobacco to the coiling equipment causes the wind speed of the system to change, which affects the stability of the tobacco conveying. The design of low-speed stable feeding filter system has been applied in the actual operation of Ningbo Cigarette Factory. The system runs stably under low wind speed conditions, which has great use and promotion value.

1.Introduction

Feeding filter system has become the main way of tobacco conveying between silk making workshop and rolling workshop due to its advantages of simplicity, high efficiency, stable operation and convenient maintenance. A feeding filter system correspond to multiple sets of coiling unit. At present, a feeding filter system of Ningbo Cigarette Factory corresponds to 9 coiling units. The intermittent and random nature of the tobacco shreds of each unit leads to unstable wind speed in the feeding filter and affects the feeding effect. Feeding filter system design should optimize the wire feeding route, shorten the path and reduce the elbow. At the same time, in the case of ensuring the supply of tobacco and not blocking the pipeline, the feeding speed of the tobacco is reduced to reduce the adverse effects such as tobacco shredding, moisture deviation and fragrance loss. And the system is stable and energy-saving.

2 Air volume demand and system design

The coiling equipment of Ningbo Cigarette Factory has Protos70, ZJ112, ZJ116 and other models. The wind demand for feeding of each model is shown in Table 1.

Table 1 The wind demand for feeding of each model

| mumber | model | demand (m ³ /h) |
|--------|----------|----------------------------|
| 1 | Protos70 | 1000 |
| 2 | ZJ112 | 2000 |
| 3 | ZJ116 | 2000 |

The system design uses a cluster tube return air system^[1-2]. A static pressure tank is arranged at the end of the return air pipe, which not only functions as a branch of the pipeline but also achieves the effect of balancing the pressure. The piping of each coiling equipment is relatively independent and the



length is basically the same. The correlation between the devices is relatively low, and the balance device can be used to reduce the large fluctuation of feeding speed. The design layout of the system is shown in Figure 1. This design uses a negative pressure system with the fan at the end of the pipe. A flat bag filter is installed at the front end of the fan to purify the dust in the return air. The air volume compensation device^[3] is set at the static pressure box. When the number of feeding equipment is small and the wind speed of the main pipe is lower than 8 m/s, the electric butterfly valve is opened to compensate the air volume to ensure the pressure change of the static pressure box is small, and the feeding speed is stable. In order to balance the resistance, an independent control device is provided on the feeding pipe and the return air branch pipe. The device has the function of measuring and adjusting the speed of the tobacco feeding. Through the direct measurement of the speed of the tobacco feeding, the feeding speed is adjusted to the lowest possible, thereby achieving the requirements of low speed of feeding and system energy saving.

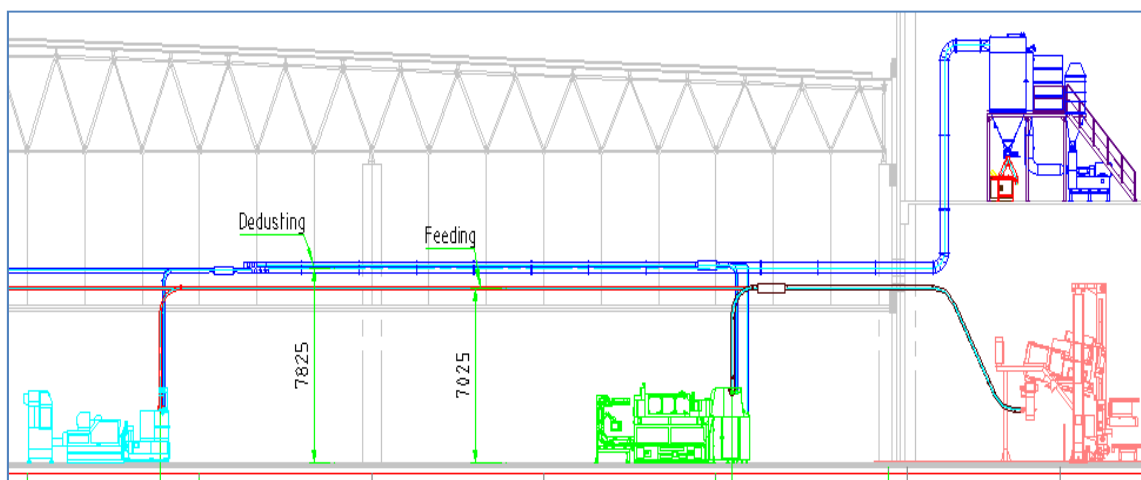


figure1. Pipe schematic of feeding filter system

3 system operation

Monitoring the wind speed of the mains pipe of the feeding filter system and the feeding speed of a cigarette machine^[4]. The result is shown in Figure 2. The feeding speed does not change much and is maintained at 18 ± 0.5 m/s. The wind speed of the main pipe fluctuates greatly, fluctuating between 8.3 and 11.5 m/s. It can be seen that regardless of the suction of other branch cigarette machines in the system, the single feeding speed can be kept at a low speed under the regulation of the independent control device of the cigarette machine. The wind speed of the main pipe changes due to the change in the number of feeding machines. Under the action of the end air volume compensation device, the wind speed of the main pipe is higher than 8 m/s. Prevent the main pipe from being blocked and ensure the system is stable.

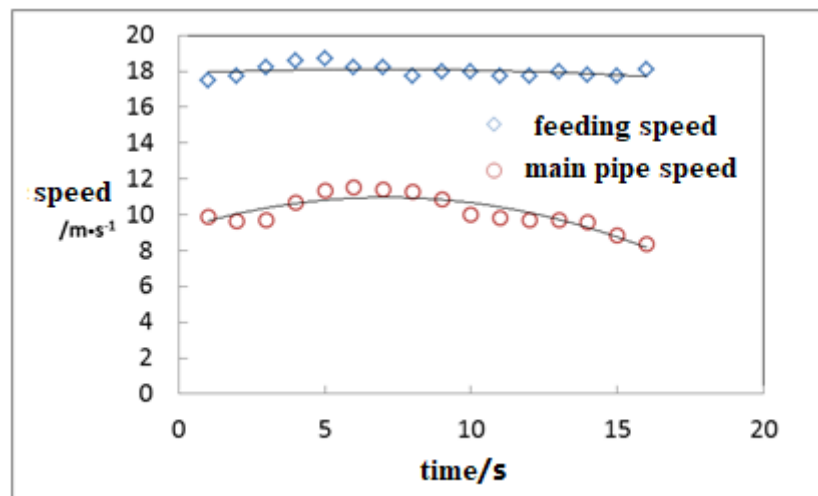


Figure 2. Diagram of feeding speed and main pipe wind speed

The pressure of static pressure box is monitored and fitted to air volume of the pipe. The result is shown in Figure 3. It can be seen from the figure, due to the randomness of feeding, the air volume varies greatly, between 6000 and 8000 m³/h. However, the wind pressure is basically stable through the adjustment of the fan frequency^[5] and air volume compensation device of the system. The wind pressure is stable at 7500±150 pa, which guarantees the stability of the single feeding speed.

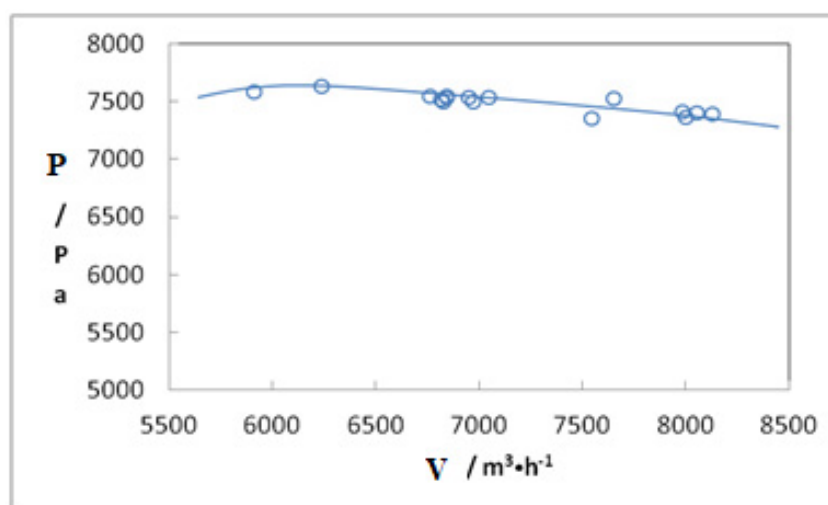


Figure 3 The change of wind pressure and air volume

4 Conclusions

The wind pressure of feeding filter system is stable under different working conditions through the adjustment of the fan frequency and the compensation of the end air volume. Through the direct measurement of the speed of the tobacco feeding by independent control device, the feeding speed is adjusted to the lowest possible, thereby achieving the requirements of low speed of feeding and system energy saving.

Acknowledgment

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