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Analysis Of Technological Processes Of The Zarbdor Cotton Cleaning Plant And Dust Collecting Devices

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Abstract – The article discusses the issues of effective use of equipment in the cotton ginning industry. A brief description of the dust collecting devices used is given. The role of the ginning industry in light industry is revealed. The article describes measures for the modernization of production in light industry, technical re-equipment of industrial enterprises, reconstruction of equipment that does not meet modern production requirements. Conclusions are made on improving the organization of production for the effective purification of polluted air and the use of equipment in the cotton ginning industry.

Keywords – Ginning Industry, Production Efficiency, Plant Productivity, Capacity, Equipment Loading.

I. INTRODUCTION

Cotton ginning plants are complex and multifunctional industries that ensure the receipt of the entire volume of raw cotton produced, its storage, timely and high-quality primary processing, shipment of finished products to consumers, as well as the preparation of sowing cotton (seeds).

The quality and cost of the products manufactured by the cotton mill, the level of its final main technical and economic indicators depend on the successful organization of raw cotton purchases, strict adherence to standards, rules for receiving, storing and pre-processing.

In turn, the production itself is complex, when several types of products are simultaneously produced from one type of raw material (raw cotton) (fibers, seeds, down, down and waste containing uluk). A high yield of cotton fiber under normal conditions means a correspondingly lower level of waste [2].

The production capacity of the enterprise is established according to the indicators of the leading workshops, sections, units, installations or groups of equipment of the main production, in which the main technological processes are carried out, which are of decisive importance in ensuring the release of finished products or processed raw materials.

Also, dust collecting devices such as cyclones are used. Cyclones are the most widespread of dry mechanical dust cleaning devices. With a large input dust content, dry mechanical cleaning devices usually do not provide the required degree of cleaning η. In this case, they are used as the first stage of cleaning to reduce the input dust content in front of highly efficient devices. [3]

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II. Research Methods

More than 20 different types of cyclones have been used in the industry. Cylindrical and conical cyclones have been developed. Cylindrical cyclones include Ts-6, TsN-11, TsN-15, TsN-15U and TsN-24. The conical cyclones include SDK-TsN-33 and SDK-TsN-34.

All basic dimensions of cyclones are calculated in fractions of the inner diameter of the cyclone D. For all cyclones of the TsN type it is characteristic that the ratio of the inner diameter of the exhaust pipe to the inner diameter of the cyclone d / D = 0.59;

The degree of gas purification η is the most important technical indicator and is the ratio of the mass of Mule particles captured in the dust collection process from gases to the mass of dust particles Mvx contained in gases before cleaning, expressed as a percentage:

$$Ƞ = Mule / Mvx\ 100; \quad (1)$$

or

$$Ƞ = Mule / (Mule + Mout)\ 100; \quad (2)$$

where Mvx is the mass of particles per unit of time contained in gases after cleaning, g / s or kg / h.

If, when calculating the degree of cleaning, it turns out that the required degree of cleaning is not provided, then it is possible to install cyclones in two successive stages of cleaning. It should be borne in mind that when leaving the first stage of cleaning, fine dust particles prevail in the gases and therefore the achieved degree of cleaning in the second stage will be lower than at the first stage of cleaning. The degree of purification of gases and the method of operation of dust-cleaning installations of the TsN type show that their degree of purification is very low. The main reason for this is the lack of clarity of interactions between the degree of purification of the dust-cleaning apparatus and the composition of the gas being purified.

For this, it is necessary to study the practical and theoretical aspects of dust-cleaning plants, taking into account the physical-mechanical and chemical properties of the dust being cleaned [4].

Below is the technology and equipment at the enterprise "Zarbdor cotton ginning enterprise" in the Zarbdor district of Jizzakh region (tab. No. 1).

Brief information about the technical equipment of the Zarbdor cotton ginning plant:

Table No. 1

Workshops of the open joint stock company "Zarbdor cotton ginning plant"	
Raw cotton collection point	48 cotton riots
Portable compartment (transshipment)	12 transmitters
Drying department	2 pcs. 2 drying drums SB-10, heat generator IICh 1.9
Dust cleaning department	2 separators SS-15 and 10 HK and 3 sets of universal cotton ginning machines UKhK
Main building	2 gin mechanisms 5 DP 130 and 12 liners 5 LP
Press department	Model DA 8237

Dust cleaning equipment	13 pcs. TC-6 Dust cleaning equipment

7 types of pollutants are emitted from the sources of atmospheric air pollution at the enterprise (table No. 2), the total amount is 140.456826 t / year, which are as follows:

Brief information on pollutants.

Table No. 2

Pollutant name	Productive waste.	In percents.
Cotton dust	136,58 t / year,	97,24%;
Carbon monoxide	3,1 t / year,	2,21%;
Nitric oxide	0, 596 t / year,	0,424%;
Benzapirene	0,000026 t / year,	0,00002%;
Metal dust	0,171 t / year,	0,13%;
Welding dust	0,0086 t / year,	0,006%;
Manganese oxide	0,0012 t / year,	0,0009%;
The amount of solid pollutants	136,7596 t / year	97,37%,

III. Results Of The Study

Zarbdor cotton ginning plant has only 77 devices and equipment in which polluting substances are formed. The number of sources is 19, of which 16 are organized sources, 3 are unorganized sources, and the amount of pollutants is 140.456826 t / year. The main sources of pollutants are the cleaning department, source numbers 5: 12.

Each source has a Ts-6 dust collecting apparatus, the sources are organized, parameters: height H = 11.3 m, diameter D = 0.6 m. The operating time of the source is 6480 h / year, the air temperature is T = 120. Cotton dust, formed during the operation of the cleaning equipment in the cleaning department, is released, is cleaned and emitted into the atmosphere by the dust-collecting equipment Ts-6 installed outside. The amount of dust generated and emitted into the atmosphere was determined by the PM and PLC dust analyzer of the EDM 365-SVS model and by the calculation method.

The maximum capacity of the dust mixture in the air before cleaning is Cmax = 568.3 mg / m3, the average capacity is Cav = 529.5 mg / m3. The speed of the dust flow is 13.3 m / s, the volume is 3.76 m / s.

According to [5], we find out the maximum amount of cotton dust per unit of time and define it by the following formula:

B1 = V × Cmax: 1000;

B1 = 3.76 × 568.3: 1000 = 2.14 g / sec;

The average is as follows:

B2 = V × Cav: 1000;

B2 = 3.76 × 529.5: 1000 = 1.99 g / s;

Total amount:

M1 = 1.99 × 6480 × 3600: 1,000,000 = 46.42 t / year.

The dust flow rate at the outlet of the treatment plant is 12.6 m / s, the volume is 3.56 m / s, the minimum productivity is Cmax = 136.4 mg / m3, the average productivity is Cav = 121.8 mg / m3.

The maximum amount of cotton dust per unit of time is as follows:

B3 = 3.56 × 136.4: 1000 = 0.485 g / sec.

The average is as follows:

B4 = 3.56 × 121.8: 1000 = 0.434 g / sec.

Total amount:

M2 = 0.434 × 6480 × 3600: 1,000,000 = 10.12 t / year.

The cleaning efficiency of dust collecting equipment is C-6 = 78.2%.

Improving the quality of cotton products and minimizing environmental pollution has always been an important task for ginneries. With the introduction of a new republican standard for cotton fiber, developed at the level of world standards, instead of the all-Union requirements for this indicator, they increase sharply.

IV. Conclusion

Therefore, it is important to re-equip or improve cotton processing plants in our republic, which will lead to a decrease in emissions or waste into the environment.

Methods for ensuring high quality of cotton products are determined by the technological regulations for processing raw cotton at all operations. Strict adherence to these rules and a creative approach to business guarantees the production of good quality products. But there are other reserves for improving the quality of cotton fiber and related products, as well as for more efficient use of existing capacities: improving the organization of production, shift and off-season operation of cotton factories.

Thus, the effective use of new technologies in the ginning industry leads to improved end results.

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