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Measures To Reduce Environmental Pollution In Cotton Cleaning Enterprises

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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

Mining and public utilities are also involved in atmospheric pollution. Because of the burning of activated coal, various toxic gases, smoke, soot, and ash are released into the atmosphere. Consequently, 67% of sulfur dioxide emitted into the atmosphere comes from coal combustion, 12% from oil combustion, and 13% is activated due to copper melting. [1]

Pollution of the atmospheric air by various heavy metals, industrial wastes, and other substances ultimately endangers the life of living beings on land and in water bodies of the biosphere. Such airborne mixtures gradually settle to the surface, severely hampering the growth and development of plants. As a result, the root structure, morphological features, activity of shoots, leaves and flowers are somewhat weakened, and they lag behind in growth and development. In some cases species of plants and animals are also sentenced to death. For example, at high levels of toxic, volatile gases and heavy metals (fluorine, strontium, tin, etc.) in the atmosphere, all living things suffer. Sulfur dioxide, hydrogen, fluorine, ozone, chlorine, and other compounds are extremely dangerous to plants. Gases and heavy metals are especially intolerant.

For example, the aluminum plant in Tajikistan has a negative impact on the growth and development of many plant species of the Surkhandarya oasis. Especially dates, cotton, pomegranates, figs, vegetable crops (cabbage, onions, tomatoes, etc.), grapes and even tobacco crops do not withstand such an attack of toxins, of course. [2]

Some of the harmful substances released into the biosphere are not neutralized in the biological cycle and remain undigested for years. This disturbs the natural balance, gas, water and geochemical order of the biosphere. There is a serious conflict between man and nature. The rapid development of industry has led to a steady increase in emissions of pollutants into the atmosphere and hydrosphere. The total volume of industrial, agricultural and domestic waste is estimated at billions of tons per year on a global scale. [3]

The main direction to reduce industrial emissions into the air basin is to improve the technology of production processes and the main technological equipment. When choosing technological units, one should pay attention to more powerful units. For example, a blast furnace with a capacity of 5000 m3 today will replace a blast furnace shop, and dust and carbon dioxide emissions can be significantly reduced only by reducing the sources of dust and gas emissions. [4]

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II. Research Methods

Two different methods are used to determine the amount of dust in the air:

1. Weight method.

2. The counting method.

The weight method is widely used because it is convenient.

To determine the content of dust in the air by weighing, the following formulas are used:

$$C = \frac{q_1 - q_2}{V_0} * 1000 \qquad (1)$$

The weight of the dust is determined by weighing the filter. Here:

S - total amount of dust mg/m3;

q_1 and q_2 - net weight of the filter, i.e. before and after pollination, in mg;

V0 - volume of air passing through the filter, air temperature and barometric pressure are taken into account.

This volume of air is found by the following formula.

$$V_0 = \frac{273 * V_t * B}{(273 + t) * 760}, [m^3] \qquad (2)$$

c:

B - barometric pressure, Pa (1 mm Hg 133.322 Pa)

t - air temperature in the point of dust sampling, 0C

W - volume of air passed through the filter measured by the instrument (liters), which can be calculated as follows:

$$V_t = t * v, (3)$$

where: v - volume velocity of the air sucked through the filter, l/min.

t - time of the experiment, min.

III. Results Of The Study

Analytical determination of dustiness of aspiration networks of cotton cleaning plant of "Juma Pakhta Tozalash" JSC using micromonometer [5]

Source 4. Dust collector Ts-6, fan TO-25, height N=11,2 m, diameter D=0,52 m.

Air pressure P=735 mm, temperature T=9 0C, correction factor q=0.90. Micromonometer readings DR = 60, 50, 40 before cleaning.

Determining the readings of the micromonometer, we determine the speed of the powder mixture by the following expression:

$V_1 = \sqrt{60} * 1,69 = 13,09$ m/s

$V_1 = \sqrt{50} * 1,69 = 11,95$ m/s $\quad V_{aver.} = 11,91$ m/s

$V_1 = \sqrt{40} * 1,69 = 10,68$ m/s

The cross-sectional area of the weld is:

$F = p * D^2 / 4 = 3.14 * 0.602 / 4 = 0.282\ m^2$

Let us determine the volume of dust mixture coming out of the pipe as follows:

$Q = Vort * F * 0.90 = 11.91 * 0.282 * 0.90 = 3.02\ m^3/s$

Using the aspirator, determine the proportion of dust in the air and the amount per unit time:

Vh = 10 l/min * 5 min = 50 l = 0.05 m3

V0 = 0.05 * 0.90 = 0.045 m3

$S = DQ/V_0$, mg/m^3, $S_1 = 3.61/0.045 = 80.22\ mg/m^3$

$S_2 = 2.92/0.045 = 64.88\ mg/m^3$ $S_3 = 4.2/0.045 = 93.33\ mg/m^3$

Diversity = $79.47\ mg/m^3$

V = 79.47 * 3.02 * 0.001 = 0.2399 g/s

Micromonometer readings after cleaning DR = 30, 20, 10

Determining the readings of the micromonometer, we determine the velocity of the powder mixture according to the following expression:

$V_1 = \sqrt{30} * 1,69 = 9,25$ m/s

$V_1 = \sqrt{20} * 1,69 = 7,55$ m/s $\quad V_{aver.} = 7,38$ m/s

$V_1 = \sqrt{10} * 1,69 = 5,34$ m/s

The cross-sectional area of the weld is:

$F = p * D^2 / 4 = 3.14 * 0.602 / 4 = 0.282\ m^2$

Let us determine the volume of dust mixture coming out of the pipe as follows:

$Q = Vort * F * 0.90 = 7.38 * 0.282 * 0.90 = 1.873\ m^3/s$

Using the aspirator, determine the proportion of dust in the air and the amount per unit time:

$Vh = 15$ l/min * 5 min = 75 l = $0.075\ m^3$

$V0 = 0.075 * 0.90 = 0.0625\ m^3$

$S = DQ/V_0$, mg/m^3, $S1 = 1.2/0.0625 = 17.77\ mg/m^3$

$S_2 = 1.3/0.0625 = 19.25\ mg/m^3$ $S_3 = 1.2/0.0625 = 16.29\ mg/m^3$

Diversity = $79.47\ mg/m^3$

Variety = $17.77\ mg/m^3$

V = 17.77 * 1.873 * 0.001 = 0.03328 g/s,

Ƞ = 0,2399 - 0,03328 / 0,2399 * 100 = 86,13%

IV. Conclusion

The results of the analytical work show that the efficiency of dust-cleaning equipment in cotton cleaning plants has decreased. Improvement of efficiency of existing old dry mechanical dust collectors is achieved by installation of additional filters or modern electronic filters. [6]

The main direction of reduction of industrial emissions is improvement of technologies of production processes and the main technological equipment. When choosing technological units, one should pay attention to more powerful units. New types of

energy, even through greater use of alternative energy, will reduce the amount and quantity of pollutants emitted into the environment.

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