ANALYSIS OF CLEANING PROCESS METHODS AND MACHINES

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Abstract
The article analyzes technological machines, their types, operation, and methods, as well as their shortcomings and the scientific and research work carried out on their elimination, used in the process of fibre cleaning, which is the main product of spinning enterprises. The authors proposed new technological methods to overcome the shortcomings identified as a result of the analysis

Keywords: fibre, cleaning, mechanical cleaning, aerodynamic cleaning, electropneumomechanical, chamber, inlet pipe, outlet pipe separating blade, Kolesnik.

There is no doubt that the light industry will retain its important role in the development of the republic's industrial complex shortly. In this case, the financial and intellectual reserves of the industry are concentrated on scientific research and priority directions of scientific and technical activities, which are important for the implementation of priority directions of socio-economic development of the country. The development of innovative technologies and the creation of competitive products based on them in the world markets become the basis of progress in this regard [1].

Today, mechanical, aerodynamic, and electropneumomechanical methods are effectively used in the cleaning of fibrous mixtures.

In the mechanical cleaning method, the shredded fibres moving in a free state are separated and cleaned into smaller pieces under the impact of the working organs.

In the aerodynamic cleaning method, by changing the trajectory of movement of fibres in the direction of the airflow, the defects in them are separated under the influence of inertial forces.

In the electropneumomechanical cleaning method, separation of defects occurs as a result of the effect of electric charges on the cross-sections of moving fibre particles [2].

Examples of basic cleaning machines are UNIflex B60 (Riete), CL-C 1, CL-C 3, CL-C 4 Sleanomat system (Trutzschler), B 37, B 38 (Marzoli) models (Fig. 1). In this cleaner, needle and saw-toothed organs are used together, and the cleaning system is distinguished by its shortness. This machine is effectively used in cleaning short and medium-fibre cotton. Supply mixers, hopper devices, scrubber cleaners and mixing machines can be used to supply cleaners in the CLEANOMAT system with products. The technological process in the cleaner is as follows.

Figure 1. Fibre cleaning machines of various companies

	**Rieter fibre cleaning machine**
	**Truchler B 37 fibre cleaning machine**

A layer with a uniform thickness is formed from the Tula pieces dropped on the conveyor with the help of a pressing roller [3]. The compacted fibre layer is conveyed to the first receiving drum by means of a pressing roller and supply rollers.

The surface of the receiving drum is covered with needles, in which preliminary cleaning takes place. From its surface, the fibres pass to the second cleaning receiving drum [4]. Fibre fragments coming out of the third drum are easily separated from the teeth of the set by the airflow, due to the fact that they are separated into separate fibres up to 80%. Under the first and third drums, and above the second drum, a cleaning device is installed, consisting of a beater blade, a guide bar and a push device. This device serves to separate defects from crushed and crushed fibre pieces.

The task of aerodynamic cleaners is to clean the dust and short fibres remaining in the fibre. The principle of operation of aerodynamic cleaners is two-fold, the first one is based on the difference of the inertial force of metal pieces and other heavy objects from the inertia of the fibre, and the second one is based on the difference of air pressure on the two sides of the perforators. Aerodynamic cleaners can be hopper or tubular.

Aerodynamic cleaners such as Securomat, Seporamat, Dustex, LT, LTB and ASTA, SP-MF, SP-F are effectively used for cleaning cotton fibres in textile enterprises of the world countries. Aerodynamic cleaners differ in their construction and operation. In the DUSTEX SP-DX cleaner of the "Truchler" company, the technological process is carried out as follows. Fibrous pieces pass through the pneumoconveyor with the help of a pusher fan, and through the device-screen that distributes the fibres evenly, they are wrapped on different surfaces and begin to fall down, losing their speed. A fan that draws air from various holes located in the lower part of the hopper transfers the fibres to the pneumoconveyor [5]. Separated dust and short fibres pass through the perforations into the dust chamber, and the short fibres fall into the chamber and are transferred to the next machine through the driver fan in the pneumoconveyor.

The operation of the machine is controlled by a computer. Among the new constructions of cleaning machines, it is necessary to include machines for cleaning heavy objects and foreign objects. In the following years, various companies, as a result of improving the designs of this type of machine, developed new methods of removing objects of other colours and types (chemical fibres, threads, polyethene, etc.) from among the fibres [6]. Trutzchler's achievements in this field lead to an increase in the quality of the finished product and a decrease in damage to the working parts of the machines as a result of the addition of TTA.

In this article, the authors analyzed the methods of fibre cleaning machines.

The following technical requirements are imposed on fibre cleaning machines: they must separate the maximum amount of dirt and dead matter, ensure its release in standard norms; the appearance of the fibre should be improved during fibre cleaning; The amount of fibre in the waste should be minimal.

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