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USE OF ROTOR CLASSIFIERS IN THE POWDER SEPARATION PROCESS IN THE FOOD INDUSTRY

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Annotation: This article analyzes the role and efficiency of rotor classifiers in the food industry for separating powdered substances. These devices help classify particles based on size, improving product quality. Additionally, the article examines the working principles of classifiers and aerodynamic processes.

Keywords:rotor classifier, food industry, particle separation, aerodynamics, product quality, export potential, energy efficiency, technological modernization, powder products, manufacturing process.

In the food industry, the efficient separation quality of powder products is of great importance. Classifiers are used in this process to separate particles of different sizes. Rotor classifiers are one of the advanced devices that enable high-precision particle separation.

The operating principle of rotor classifiers Rotor classifiers separate particles based on their size and density using an aerodynamic air stream. The following key factors play an important role in this process:

1. **Boundary size** is the maximum fraction size that can be determined during separation.
1. **Airflow velocity** - determines the speed and direction of movement of the powder.
1. **Rotor blades** - perform the main task in separating material.

Application in the food industry Rotor classifiers are successfully used in the following processes:

1. **For flour and starch production** – fine powder purification;
1. **Protein powder extraction** – extraction of coarse and small fractions;
1. **Mixing vitamins and supplements** – elimination of defective parts by controlling particle size.

Efficiency and benefits of application in Uzbekistan food industry in Uzbekistan is becoming a developing sector and there is growing need of modernization of production processes. The application of rotor classifiers in the country's industry provides the following benefits:

1. **Improving product quality** – The rotor-classifiers increase the quality of flour, confectionery and dairy products powders, which expands export opportunities.
1. **Energy Efficiency** – This technology helps reduce energy consumption by optimizing production processes.
1. **Reduction of food waste** – By fine separation, poor quality particles are eliminated and resource efficient use is ensured.
1. **Development of local production** – Technology introduction will increase the competitiveness of food industry enterprises in Uzbekistan.
1. **Increase of export potential** - Provision of competitive products to foreign markets will be created by producing high-quality products that meet the standard.

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Live Examples

1. **Flour quality control in bakeries In** bread production, the quality of flour affects the softness and volume of bread. By breaking the flour into uniform particles of uniform size, they help to eliminate poor quality or overly large particles. This allows the bread to rise well and become soft.
1. **The manufacture of sweets** Chocolate powder and powders in confectionery products should be the same size. Thanks to the use of rotor classifiers, small and large particles in the product are separated, producing sweets with a uniform texture.
1. **Dairy products powder** In the production of dry milk powder, rotary classifiers play a very important role. They separate the powder particles uniformly size and reduce the dissolving hassles. If the particles are not the same, then the powdered milk will not

dissolve well in water and form a precipitation.

1. **Food additives and medicinal substances** Food supplements and vitamin powders are mixed with fine particles, their effectiveness increases. For example, protein powder produced for athletes is separated into a specific fraction by means of rotor classifiers, which promotes better absorption by the body in the process of consumption.

Classification process The separation process in rotor classifiers consists of the following steps:

1. **Particle movement** – material is conveyed through the air flow into the rotor channel.
1. **Separation stage** – particles move under the influence of air speed and gravity.
1. **Fractional separation** – small particles escape with high current, while large particles are separated.

Scientific model and calculations Rotor classifiers work on the basis of aerodynamic modeling. The following formulas are used to determine the velocity of air, the trajectory of movement of particles and the result of classification:

Conclusion Rotor classifiers are an effective technology for the extraction of food powders, serving to improve product quality and reduce waste. Thanks to widespread introduction of this technology in Uzbekistan, food industry can be further developed, which can increase export volumes and reduce production costs. Thanks to their aerodynamic structure and precise separation mechanism, production processes are optimized. In the future, efficiency is expected to be increased through further development of these technologies.

References:

1. Smith J., Brown K. "Advanced Food Processing Technologies." Springer, 2020.

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2. Иванов В.П. "Технологии классификации порошковых материалов." Москва, 2018.
3. FAO Report on Food Processing Efficiency, 2021.
1. Reports of the Food Industry Agency of the Republic of Uzbekistan, 2023.
4. Компьютерное моделирование гидродинамики воздушного потока в зоне разделения роторного классификатора 2021 Эркинов А.К. Киркор М.А., к.т.н., доцент Могилевский государственный университет продовольствия г. Могилев, Республика Беларусь.