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# ANALYSIS OF THE PRINCIPLES OF BELT CONVEYORS

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*In almost all industries, belt conveyors are used, which ensure the continuity of the processes of transporting various types of goods and materials. Their use allows to deliver piece loads and materials that have a bulk / lump structure to the desired object.*

There are two main types of resources that a person uses: renewable and non-renewable. Renewable resources include all those resources that are restored by photosynthesis in the foreseeable future. We are talking primarily about all types of vegetation and the resources that can be obtained from it. Non-renewable resources include minerals that will not recover in the foreseeable geological time [1,2].

Today, for example, the society has a diverse structure of various household and industrial waste, using existing technological processes. The waste accumulates in the course of time and becomes a serious problem.

The relevance of this work is determined by the fact that the need to recycle waste plays a huge role in people's lives – it is a necessary condition for their health and the health of their generations.

Since the 1980s, the production of conveyors in industrially developed countries gradually became a separate field of mechanical engineering. In modern types, the main structural elements have been preserved, which have been improved in accordance with the achievements of science and technology (replacing the belt drive with an electric one, using vibration technology, using compressed air energy, etc.).

The main classification feature of conveyors is the type of traction and load-bearing body. There are conveyors with belt, chain, rope traction bodies and conveyors without a traction body (gravity, inertia, screw). Conveyors with a traction body can be belt-type, plate-type, cradle-type, scraper-type, bucket-type, etc. These are characterized by the general movement of the load on the working areas with the working body. The traction force is transmitted either by a load-bearing element, or by an element pushing or pulling the load along a fixed chute, pipe, flooring, etc.

Depending on the conditions, floor and suspended conveyors are used. Floor coverings can be stationary, mobile or portable. On the conveyor, you can move the load in a horizontal or close to it inclined plane (belt, plate, trolley, scraper, roller, screw, vibrating, swinging); in a vertical or close to it inclined plane (scraper, bucket, screw, vibrating); in any plane [1].

Special groups are elevators, vertical conveyors with suspended buckets, cradles or shelves, escalators, special plate and belt conveyors for moving people, walking conveyors, trimmers, stackers for stacking logs, as well as combined (for example, roller-belt conveyors of the "Rapistan" type, which ensure the retention of piece loads on descents at specified intervals), etc. [2].

Main types of conveyors:

1. Belt conveyors are used to move bulk, lump and piece goods over distances that sometimes reach 10-12 km or more. These are usually made up of separate sections. The conveyor route is straight in the horizontal plane, and in the vertical plane it can be inclined or have a more complex configuration.
2. Plate conveyors are designed to move in a horizontal plane or with a slight inclination (up to 35°) heavy (500 kg or more) piece loads, large-sized, including sharp-edged materials, as well as loads heated to a high temperature. Lamellar, stationary or mobile, have the same basic nodes as the tape ones.
3. Scraper conveyors move the load by moving the scrapers along the chute or pipe. These are used for processing bulk or lumpy cargo entering the chute through the loading funnel. Scraper conveyors are usually used to move cargo over distances of up to 100 m. A variety of scraper conveyors are conveyors with submerged scrapers, in which the scrapers cover only part of the section of the chute, and the load fills the entire working branch of the chute or most of it. Such trucks can have a complex track and are used to move loads (usually small-bulk) in horizontal, vertical and inclined directions at a speed of 0.1-0.25 m / s.
4. Suspended conveyors with a chain traction body are used for continuous (less often periodic) movement of piece loads. The route of such conveyors is usually spatial closed and has a complex contour. Suspended conveyors are divided into 3 groups: load-carrying (carriages for cargo are permanently connected to the traction body); pulling (carriages are also permanently connected to the traction body and have hooks for attaching trolleys moving on the floor of the workshop or warehouse); pushing (carriages are not permanently connected to the traction body and move along suspended tracks). The use of suspended conveyors makes it possible to solve the problems of complex mechanization and automation of loading and unloading and storage operations at the junction of intra-shop, intra-factory and mainline transport.

5. Screw conveyors are used to move pulverized and small-sized loads in horizontal or inclined (up to 20°) planes, less often in the vertical plane (conveyors with rapidly rotating screws). Screw conveyors are simple in design, easy to operate, especially when transporting dusty goods.

6. Roller conveyors are used for moving piece loads with a flat, ribbed or cylindrical surface. They come in 2 types: gravity and drive. In gravity conveyors installed with a slope of 2-5°, the rollers rotate freely under the influence of the gravity of the load being moved. In drive conveyors, the rollers have a group drive from the motor. These are used when it is necessary to ensure a constant speed of movement of goods, to move them in a strictly horizontal plane or to lift them at a certain angle.

7. Inertial conveyors are used for transporting bulk, less often small piece goods over relatively short distances in horizontal or inclined (up to 20°) directions. In these conveyors, cargo particles slide along the load-bearing body or fly in space under the influence of inertia. They are divided into 2 groups: swinging, characterized by significant amplitudes and low frequency of vibrations, and vibrating — with a small amplitude and high frequency of vibrations [2,3].

Knowing what the conveyor belt consists of and what the functional purpose of its elements is, it is possible to change certain nodes to achieve the appropriate technological characteristics of the entire device.

The efficiency of using conveyors in the technological process of any production depends on how much the type and parameters of the selected conveyor correspond to the properties of the cargo and the conditions in which the technological process takes place. These conditions include: productivity, length of transportation, shape of the route and direction of movement (horizontal, inclined, vertical, combined); conditions for loading and unloading the conveyor; the size of the load, its shape, specific density, abrasiveness, lumpiness, humidity, temperature, etc.; the rhythm and intensity of the feed, as well as various local factors [4-8].

REFERENCES

1. Зенков Р. Л., Петров М. М., Конвейеры большой мощности, М., 1964;
2. Спиваковский А. О., Потапов М. Г., Котов М. А., Карьерный конвейерный транспорт, М., 1965;
3. Транспортирующие и перегрузочные машины для комплексной механизации пищевых производств, под ред. А. Я. Соколова, М., 1964;
4. Спиваковский А. О., Дьячков В. Н., Транспортирующие машины, 2 изд., М., 1968.
5. Соловьев В.В., Заргарян Е.В., Заргарян Ю.А., Белоглазов Д.А., Косенко Е.Ю. Проектирование и моделирование объемного гидропривода. Ростов-на-Дону: Изд-во ЮФУ, 2015. – 97 с.
6. Рой Ю.В, Заргарян Е.В. Технологический процесс системы управления блока сепарации установки комплексной подготовки нефти. / Электронный научный журнал «Вестник молодёжной науки России», Выпуск №1, 2020, ISSN 2658 – 7505
7. Финаев В.И., Скубилин М.Д., Заргарян Ю.А Волоконнооптические преобразователи в электроэнергетике. Известия ЮФУ. Технические науки. 2018. С. 213.
8. Пушнина И.В. Алгоритмическое обеспечение автоматической работы светофора. В сборнике: Технологии разработки информационных систем ТРИС-2019. Материалы IX Международной научно-технической конференции. 2019. С. 120-124.