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## Belt conveyor development trend and direction

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### Abstract

This article describes the development status of belt conveyors, and points out that in the process of production and transportation of belt conveyors, there are problems such as low production efficiency, serious power consumption, and continuous increase in production costs. It is pointed out that in the future, belt conveyors will be large, intelligent and the direction of green development.

### Keywords

Belt conveyor, development trend, new conveyor belt, green technology.

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## 1. Introduction

At present, the belt conveyor has become the main transportation equipment for the coal continuous transportation industry, and can realize long-distance, large-capacity, high-power, large-angle, high-speed transport, and is widely used in coal mines and open-pit mines. Belt conveyors can achieve centralized control and reliable operation in practical applications. As a continuous transportation equipment widely used by coal mining enterprises, it consumes a lot of electric energy in the process of transporting coal and carbon, and the cost and energy consumption occupy a large proportion in the expenditure of coal mining enterprises. Therefore, reducing the energy consumption of belt conveyors and studying green energy-saving conveyors have become an important trend in the field of conveyors.

## 2. Analysis of Development Status of Belt Conveyor

The domestic belt conveyor industry has developed rapidly in the past 20 years. Large-scale belt conveyor manufacturers have gradually introduced and independently developed intelligent automation centralized control, unattended, anti-longitudinal tearing of conveyor belts, intelligent speed regulation of video recognition, and new type of idlers, rapid installation and retreat technologies, and successively developed models to meet various domestic and foreign production needs. With the efforts of scientific researchers and the application of various advanced technologies, the development of domestic belt conveyors has shown a vigorous trend. The types of conveyors are gradually increasing, the functions are no longer single, the scope of use is gradually expanding, and the efficiency is improved significantly. , has initially achieved a multi-purpose machine; transport distance, transport capacity and conveyor power is also gradually increased; reliability has also been greatly improved than before. However, due to the lack of mature technologies related to belt conveyors in China, there are obvious shortages in many aspects of conveyors. The entire transportation process consumes a lot of electrical energy and increases transportation costs; key components such as conveyor belts, idlers and rollers cannot adapt to complex working conditions, resulting in greatly reduced service life; while capable of meeting larger transport volumes and longer transportation, the conveyor's model is still relatively small. China's belt conveyor adopts a closed storage belt structure and winch tensioning. The tensioning trolley is easy to derail, the conveyor belt is

easy to deviate, and when the conveyor belt is retracted, the idler trolley is not Self-moving, manual change, troublesome repair.

### **3. The Development Direction of Belt Conveyor**

#### **3.1 Large-Scale Direction.**

In the modern production process, as the amount of coal mining continues to increase, the conveyor is also constantly updated. The transportation distance keeps increasing, especially when transporting or transporting heavy objects, the driving motor is also developed from single-motor drive to multi-motor drive, multi-motor drive can reduce the power of single motor; the drive roller is developed from single drum to double drum, dual drum drive Can increase installed power. The driving method is developed from centralized driving to multi-point driving. The multi-point driving can disperse the pressure and avoid accidents such as pressure belts, belt breakage, and motor burning.

#### **3.2 Intelligent and Networked Direction.**

The belt conveyor is unmanned in the transportation line and only controls the start and stop of the conveyor control system. In addition, the system judges whether the conveyor is safe and reliable by monitoring the conveyor tensioning device, protection device, drive unit, and brake device. However, the conveyor control system will inaccurately collect inaccurate data. The staff cannot accurately determine the operation status of the conveyor in time, need to stop the inspection, eliminate the fault, greatly affect the transportation process, reduce the transportation efficiency, and bring safe and efficient production. Great inconvenience. For this situation, a belt conveyor health management system can be built. The system adopts the "device management + Internet" model, based on the concept of "perceived + connected + value management", providing equipment users and equipment manufacturers with a platform for equipment detection and service management, which can remotely monitor the equipment. Online services such as fault warning, failure analysis, health assessment, fault diagnosis, after-sales service management, and customer relationship maintenance ensure the safe, efficient, and reliable operation of the belt conveyor.

#### **3.3 Intelligent and Networked Direction.**

##### **3.3.1 Mechanical System Structure Optimization**

1) Research new drive structures. The traditional belt conveyor adopts the "motor + reducer" transmission mode, which has low transmission efficiency, serious energy consumption, and a serious increase in production costs. The new drive structure has no mechanical transmission link and directly adopts a low speed and high torque direct drive motor. This type of drive structure occupies a small space and is easy to arrange; light weight; high transmission efficiency; high system response and control accuracy; low maintenance and high reliability.

2) Develop a new type of roller. During the process of conveying material on the conveyor, the roller group plays an important supporting role and is an important part of the conveyor. The transport distance and transport volume are relatively large, and the transportation environment is complex and wet. The anti-corrosion performance of ordinary idler rollers is poor, resulting in a significant drop in service life. This not only increases the operation and maintenance costs of the conveyor, but also brings about a large operation. Resistance has brought great inconvenience to production and transportation. In order to solve this problem, it is necessary to develop a low-resistance stainless steel idler that can adapt to complex environments, wet zones, and strong corrosion resistance, in order to reduce the running resistance, extend the service life, and reduce the wear of the belt surface.

3) Research and develop new energy-saving conveyor belts. Steel cord conveyor belt has high tensile strength, good impact resistance, small elongation during use, good groove forming, good flex resistance, and is suitable for long distance, large transport volume and high speed material transportation. However, the common steel cord conveyor belt has large volume and high weight, and

it still has the disadvantage of high energy consumption during the operation process, which further increases the transportation cost. Researching new energy-saving conveyor belts has become one of the new topics of current energy-saving technologies. By changing the mechanical structure distribution of the skeleton material, increasing the tensile strength, reducing the indentation resistance of the conveyor belt, changing the abrasion resistance of the covering rubber, and increasing the service life of the conveyor belt as the design concept, the design of the belt body is lightweight, high strength, and service life Long new energy-saving conveyor belts reduce the investment in conveyors and infrastructure and save the operating and maintenance costs of the conveyor system.

4) Study green intelligent bulk material efficient high-precision storage and distribution system. With the continuous development of production, the traditional coal storage and distribution system can no longer meet the actual needs of the modern coal industry. There are backward coal storage equipment and processes, and there is no corresponding intelligent storage and distribution system. The accuracy of most coal storage and coal distribution systems is relatively high. Low, there is no perfect on-line testing equipment, and even some coal yards stacked in the open, it is difficult to achieve automatic control and environmental pollution and many other shortcomings, can not effectively solve the problem of storage and distribution of coal of different quality, resulting in the lack of theoretical guidance for coal storage project construction and The support of experimental data has restricted the scale and modernization of coal storage and coal distribution systems. For the above problems, a large-scale, fully enclosed, environmentally-friendly, green intelligent bulk material efficient high-precision storage and distribution system can be developed. The system mainly includes an efficient unloading machine and a transloading system, accurately positions the automatic cloth and dust suppression system, and a large-scale multi-position closed bar-shaped bunker. Efficient scraper retrieving equipment, high-precision quantitative coal feeding device and intelligent coal blending system, automatic material level detection and intelligent control system, etc. Through the R&D and design of high-efficiency and high-precision bulk material storage and distribution systems and equipment, non-powered dust suppression equipment, and intelligent coal storage control systems, it is possible to intelligently and efficiently store and mix several different kinds and types of coal. In order to meet the user's special requirements for high-precision mixed coal, give full play to the advantages of coal, improve the comprehensive utilization of coal, save coal resources and reduce pollutant emissions.

### 3.3.2 Electrical System Structure Optimization

The electrical structure of the belt conveyor is complex and not only controls the drive but also controls the key components of the conveyor. Under long-term working conditions of the conveyor, the body temperature often rises and is accompanied by different degrees of vibration. If it is found that it is not timely, it will consume a lot of power and damage the machine. In order to discover and solve problems in a timely manner, it is necessary to develop a sensor element with higher accuracy and stronger energy-saving effect and install it at a key position. In addition, the structure of the electrical control system must be optimized to reduce unnecessary energy losses.

## 4. Summary

This article briefly expounds the development status of belt conveyors, and briefly analyzes the future development trend of belt conveyors. In the future, the belt conveyors should pay more attention to green energy conservation and energy consumption reduction. In the course of the development of continuous conveyors, we must not only affirm our existing achievements but also see our own deficiencies. We should continue to maintain and continue to break through our self in the good aspects, and we must be good at learning from foreign advanced technologies in areas where we are inadequate. In this way, the development of belt conveyors in our country will become better and better.

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