Long-distance belt conveyors

Continual transport of raw materials in opencast mines is provided by a system of belt conveyors which concur and bring the excavated material from the mining area to the site of its procession or temporary storing. The transport capacity usually reaches 5000 m³/h at standard width of the conveyor belt between 1200 and 2400 mm. Individual conveyors reach the length up to 1000 m.

Design

Belt conveyors are manufactured in standard lines with standard components.

The conveyor is composed of the following main sections:

1. Driving station with a drive, tensioning device and electric equipment
2. Lead-in section
3. Central section
4. Reverse station
5. Conveyor belt
6. Hopper
7. Special equipment
8. Auxiliary steel frames and covers
9. Dumping vehicle with rails or with an own caterpillar carriage
10. Controlling and diagnostic system
1. The driving station is a steel frame which holds the driving drums with the drive (flexible clutch, brake, gear-box, regulating clutch, electric motor) in an own frame, staging drum, transition drum, rectifying shield, elements for tensioning device of the conveyor belt and auxiliary frames for access to the individual components.

Another part of the driving station is a distribution substation where power suppliers and other electrical devices are situated.

2. The lead-in section of the belt conveyor is formed by a height-compensating part between the driving station and the central section. It is suspended on the driving station with the help of a joint. The other end is fixed in the ground with the help of a support. The lead-in section has upper and lower roller supports for holding the upper and lower branch of the conveyor belt.

3. The central section of the belt conveyor is composed of central parts with a standard design. They are fitted with upper and lower roller supports. A part of the supports is self-centering, eventually fitted with signalization elements. The central section serves as a supporting construction for the rubber belt.

4. The reverse station is composed of a steel frame carrying the reverse drum as well as of the side guiding, spring-loaded receiving platform, upper roller supports and self-centering lower roller support. The anchoring of reverse station is based at the following driving station, the end station is anchored in the terrain.

5. The conveyor belt is composed of several insets made of plastic fibers which provide the needed strength to the belt and of a rubber paste which binds the insets together and forms the upper and lower surface layer. In order to achieve higher strength, it is possible to substitute the insets from plastic fibers by steel wires.

6. The hopper provides elements for the receipt of material from the previous conveyor or for material loading by other types of equipment. Apart from the steel frame, the hopper contains elements which damp the strokes of falling material, side guiding, dust-sealing elements, belt-directing elements etc.

7. The belt conveyors are equipped with special devices and automation elements which safeguard their safe and failure-free operation. The self-centering roller supports located under the upper and lower belt branches react to every sideward deviation. Deviation is also monitored by electric roller controllers which can send signals and eventually stop all the conveyor in case of a defect. At the same time, the belt speed and tension is monitored by tension sensors which have an effect on automatic belt tensioning within indicated tolerance.

8. The steel supporting frame of all conveyor sections is fixed by supporting elements in a hard surface. At sites where the conveyor crosses existing roads, watercourses, valleys etc., the central section of the conveyor is positioned on a simple steel bridge construction. The construction also contains safety elements which prevent the transported material from falling down on the roads. The upper conveyor branch may be covered with plastic modular elements in order to reduce the dust level and to protect the transported material against rain or a strange falling object etc.

9. The discharge cars form a loop on belts at sites of material disposition. The discharge car (the railed design) travels on rails which are fixed to steel railroad ties (sleepers) on both sides of the belt conveyor.

The discharge car is composed of a portal framework, a tilt and swivel boom, a staging part with a drum and a rectifying shield. The framework has four props which hold two-wheel carriages. The discharging boom is mounted on the slew deck which also bears a counterweight.

10. The control system is a key element of the belt conveyor system. It provides not only a reliable start-up of the individual belt conveyors, but also a regulation of the conveying speed according to the transported volume. This has a significant effect on the operation economy. Last but not least, it safeguards a complex diagnostics of the system, defect reporting and emergency stop in case of an accident.