Conveyor belt

A **conveyor belt** is the carrying medium of a **belt conveyor system** (often shortened to belt conveyor). A belt conveyor system is one of many types of [conveyor systems](https://en.wikipedia.org/wiki/Conveyor_systems). A belt conveyor system consists of two or more [pulleys](https://en.wikipedia.org/wiki/Conveyor_pulley) (sometimes referred to as drums), with a closed loop of carrying medium—the conveyor belt—that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered [pulley](https://en.wikipedia.org/wiki/Conveyor_pulley) is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general [material handling](https://en.wikipedia.org/wiki/Material_handling) such as those moving boxes along inside a factory and [bulk material handling](https://en.wikipedia.org/wiki/Bulk_material_handling) such as those used to transport large volumes of resources and agricultural materials, such as [grain](https://en.wikipedia.org/wiki/Grain), [salt](https://en.wikipedia.org/wiki/Salt), [coal](https://en.wikipedia.org/wiki/Coal), [ore](https://en.wikipedia.org/wiki/Ore), [sand](https://en.wikipedia.org/wiki/Sand), [overburden](https://en.wikipedia.org/wiki/Overburden) and more.

## Overview

Conveyors are durable and reliable components used in automated [distribution](https://en.wiktionary.org/wiki/distribution) and warehousing, as well as manufacturing and production facilities. In combination with computer-controlled pallet handling equipment this allows for more efficient [retail](https://en.wikipedia.org/wiki/Retail), [wholesale](https://en.wikipedia.org/wiki/Wholesale), and [manufacturing](https://en.wikipedia.org/wiki/Manufacturing) [distribution](https://en.wikipedia.org/wiki/Distribution_(business)). It is considered a labor-saving system that allows large volumes to move rapidly through a process, allowing companies to [ship](https://en.wikipedia.org/wiki/Shipping) or receive higher volumes with smaller storage space and with labor [expense](https://en.wikipedia.org/wiki/Expense).

Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive.[[1]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-1) Products are conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. Belt conveyors are also manufactured with curved sections that use tapered rollers and curved belting to convey products around a corner. These [conveyor systems](https://en.wikipedia.org/wiki/Conveyor_systems) are commonly used in postal sorting offices and airport [baggage handling systems](https://en.wikipedia.org/wiki/Baggage_handling_system).

Belt conveyors are generally fairly similar in construction consisting of a metal frame with rollers at either end of a flat metal bed. Rubber conveyor belts are commonly used to convey items with irregular bottom surfaces, small items that would fall in between rollers (e.g. a [sushi conveyor bar](https://en.wikipedia.org/wiki/Conveyor_belt_sushi)), or bags of product that would sag between rollers. The belt is looped around each of the rollers and when one of the rollers is powered (by an [electrical motor](https://en.wikipedia.org/wiki/Electric_motor)) the belting slides across the solid metal frame bed, moving the product. In heavy use applications, the beds in which the belting is pulled over are replaced with rollers. The rollers allow weight to be conveyed as they reduce the amount of friction generated from the heavier loading on the belting. The exception to the standard belt conveyor construction is the Sandwich Belt conveyor. The Sandwich Belt conveyor uses two conveyor belts, instead of one. These two conventional conveyor belts are positioned face to face, to firmly contain the items being carried in a "sandwich-like" hold.

Belt conveyors can be used to transport products in a straight line or through changes in elevation or direction. For conveying Bulk Materials like Grains, Ore, Coal, Sand etc., over gentle slopes or gentle curvatures, a troughed belt conveyor is used. The trough of the belt ensures that the flowable material is contained within the edges of the belt. The trough is achieved by keeping the idler rollers in an angle to the horizontal at the sides of the idler frame. A Pipe Conveyor is used for material travel paths that require sharper bends and inclines up to 35 degrees.[[2]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-2) A pipe conveyor features the edges of the belt being rolled together to form a circular section like a pipe. Like a Troughed Belt Conveyor, a Pipe Conveyor also uses idler rollers. However, in this case, the idler frame completely surrounds the conveyor belt helping it to retain the pipe section while pushing it forward. In the case of travel paths requiring high angles and snake-like curvatures, a Sandwich Belt is used. The sandwich belt design enables materials carried to travel along a path of high inclines up to 90-degree angles,[[3]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-3) enabling a vertical path as opposed to a horizontal one. This transport option is also powered by idlers.

Other important components of the Belt Conveying System apart from the Pulleys and Idler rollers include the Drive Arrangement of reducer Gear Boxes, Drive motors, and associated couplings. Scrapers to clean the belt, Chutes for controlling the discharge direction, Skirts for containing the discharge on the receiving belt, Take Up assembly for "tensioning" the belt, Safety switches for personnel safety and Technological Structures like Stringer, Short Post, Drive Frames, Pulley Frames make up the balance items to complete the Belt Conveying system. In certain applications, Belt conveyors can also be used for static accumulation or cartons.

## Structure[[edit](https://en.wikipedia.org/w/index.php?title=Conveyor_belt&action=edit&section=3)]

The [belt](https://en.wikipedia.org/wiki/Belt_(mechanical)) consists of one or more layers of material. It is common for belts to have three layers: a top cover, a carcass and a bottom cover. The purpose of the carcass is to provide linear strength and shape. The carcass is often a woven or metal fabric having a [warp](https://en.wikipedia.org/wiki/Warp_(weaving)) & [weft](https://en.wikipedia.org/wiki/Weft). The warp refers to longitudinal cords whose characteristics of resistance and elasticity define the running properties of the belt. The weft represents the whole set of transversal cables allowing to the belt specific resistance against cuts, tears and impacts and at the same time high flexibility. The most common carcass materials are [steel](https://en.wikipedia.org/wiki/Steel), [polyester](https://en.wikipedia.org/wiki/Polyester), [nylon](https://en.wikipedia.org/wiki/Nylon), [cotton](https://en.wikipedia.org/wiki/Cotton) and [aramid](https://en.wikipedia.org/wiki/Aramid) (class of heat-resistant and strong synthetic fibers, with [Twaron](https://en.wikipedia.org/wiki/Twaron" \o "Twaron) or [Kevlar](https://en.wikipedia.org/wiki/Kevlar) as brand names). The covers are usually various rubber or plastic compounds specified by use of the belt.

Steel conveyor belts are used when high strength class is required. For example, the highest strength class conveyor belt installed is made of steel cords. This conveyor belt has a strength class of 10,000 N/mm (57,000 lbf/in) and it operates at [Chuquicamata](https://en.wikipedia.org/wiki/Chuquicamata" \o "Chuquicamata) mine, in [Chile](https://en.wikipedia.org/wiki/Chile).[[8]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-8) Polyester, nylon and cotton are popular with low strength classes. Aramid is used in the range 630–3,500 N/mm (3,600–20,000 lbf/in). The advantages of using aramid are energy savings, enhanced lifetimes and improved productivity.[[9]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-9)[[10]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-10) As an example, a 2,250-newton-per-millimetre (12,800 lbf/in), 3,400-metre-long (3,700 yd) underground belt installed at Baodian Coal Mine, part of in [Yanzhou Coal Mining Company](https://en.wikipedia.org/wiki/Yanzhou_Coal_Mining_Company" \o "Yanzhou Coal Mining Company), [China](https://en.wikipedia.org/wiki/China), was reported to provide energy savings of over 15%.[[11]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-11) Whilst [Shenhua Group](https://en.wikipedia.org/wiki/Shenhua_Group), has installed several [aramid](https://en.wikipedia.org/wiki/Aramid) conveyor belts, including a 4,400-newton-per-millimetre (25,000 lbf/in) belt with a length of 11,600 m (7.2 miles).

## Applications[[edit](https://en.wikipedia.org/w/index.php?title=Conveyor_belt&action=edit&section=4)]

Today there are different types of conveyor belts that have been created for conveying different kinds of material available in PVC and rubber materials. Material flowing over the belt may be weighed in transit using a [beltweigher](https://en.wikipedia.org/wiki/Beltweigher" \o "Beltweigher). Belts with regularly spaced partitions, known as *elevator belts*, are used for transporting loose materials up steep inclines. Belt Conveyors are used in self-unloading bulk freighters and in live bottom trucks. Belt conveyor technology is also used in [conveyor transport](https://en.wikipedia.org/wiki/Conveyor_transport_(disambiguation)) such as [moving sidewalks](https://en.wikipedia.org/wiki/Moving_sidewalk) or [escalators](https://en.wikipedia.org/wiki/Escalator), as well as on many manufacturing [assembly lines](https://en.wikipedia.org/wiki/Assembly_line). Stores often have conveyor belts at the [check-out counter](https://en.wikipedia.org/wiki/Check-out_counter) to move shopping items, and may use [checkout dividers](https://en.wikipedia.org/wiki/Checkout_divider) in this process. [Ski areas](https://en.wikipedia.org/wiki/Ski_resort) also use conveyor belts to [transport skiers](https://en.wikipedia.org/wiki/Magic_carpet_(ski_lift)) up the hill. Industrial and manufacturing applications for belt conveyors include package handling, trough belt conveyors, trash handling, bag handling, coding conveyors, and more. Integration of Human-Machine Interface(HMI) to operate the conveyor system is in the developing stages and will prove to be an efficient innovation.

Some of the major global conveyor belt manufacturers and service providers are [Berndorf AG](https://en.wikipedia.org/w/index.php?title=Berndorf_AG&action=edit&redlink=1), [Continental AG](https://en.wikipedia.org/wiki/Continental_AG), [Fenner](https://en.wikipedia.org/wiki/Fenner_(company)), [Kale Conveyor](https://en.wikipedia.org/w/index.php?title=Kale_Conveyor&action=edit&redlink=1), [Terra Nova Technologies](https://en.wikipedia.org/w/index.php?title=Terra_Nova_Technologies&action=edit&redlink=1), [ThyssenKrupp](https://en.wikipedia.org/wiki/ThyssenKrupp), [HESE Maschinenfabrik GmbH](https://en.wikipedia.org/w/index.php?title=HESE_Maschinenfabrik_GmbH&action=edit&redlink=1) and [Tenova Takraf](https://en.wikipedia.org/wiki/Tenova_Takraf" \o "Tenova Takraf). [[12]](https://en.wikipedia.org/wiki/Conveyor_belt#cite_note-digiscendepcm-12)