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CONTINUOUS TRANSPORT SYSTEMS (STRUCTURE AND TYPES)

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Continuous transport systems, in other words a conveyor system, or an assembly line - is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging industries. Many kinds of conveying systems are available, and are used according to the various needs of different industries.

An assembly line is a manufacturing process in which parts (usually interchangeable parts) are added to a product in a sequential manner using optimally planned logistics to create a finished product much faster than with handcrafting-type methods. The assembly line developed by Ford Motor Company between 1908 and 1915 made assembly lines famous in the following decade through the social ramifications of mass production, such as the affordability of the Ford Model T and the introduction of high wages for Ford workers.

Henry Ford was the first to master the assembly line and was able to improve other aspects of industry by doing so (such as reducing labor hours required to produce a single vehicle, and increased production numbers and parts). However, the various preconditions for the development at Ford stretched far back into the 19th century, from the gradual realization of the dream of interchangeability, to the concept of reinventing workflow and job descriptions using analytical methods (the most famous example being scientific management). Ford was the first company to build large factories around the assembly line concept. Mass production via assembly lines is widely considered to be the catalyst which initiated the modern consumer culture by making possible low unit cost for manufactured goods. It is often said that Ford's production system was ingenious because it turned Ford's own workers into new customers. Put another way, Ford innovated its way to a lower price point and by doing so turned a huge potential market into a reality. Not only did this mean that Ford enjoyed much larger demand, but the resulting larger demand also allowed further economies of scale to be exploited, further depressing unit price, which tapped yet another portion of the demand curve. This bootstrapping quality of growth made Ford famous and set an example for other industries.

There are a lot of types of conveyors. The widely spread ones are: conveyor belt, roller-track conveyor, pneumatic conveyor system, vibrating conveyor systems, screw conveyor, the flexible conveyor and etc.

Every pneumatic system makes use of pipes or ducts called transportation lines that carry mixture of materials and a stream of air. These materials are such as dry pulverized or free flowing or light powdery materials like cement, fly ash etc. These materials can be transported conveniently to various destinations by means of a stream of high velocity air through pipe lines. Products are moved through various tubes via air pressure, allowing for extra vertical versatility. Pneumatic conveyors are either carrier systems or dilute-phase systems; carrier systems simply push items from one entry point to one exit point, such as the money exchanging tubes used at a bank drive through window. Dilute-phase systems use push/pull pressure to guide materials through various entry and/or exit points. Three basic

systems that are used to generate high velocity air stream: suction or Vacuum systems: utilizing a vacuum created in the pipeline to draw the material with the surrounding air. Pressure Type systems: in which a positive pressure is used to push material from one point to the next. The system is ideal for conveying material from one loading point to a number of unloading points. Combination systems: in which a suction system is used to convey material from a number of loading points and a pressure system is employed to deliver it to a number of unloading points.

Roller - track conveyor. It moves horizontally or at a slight angle piece loads (ingots, blocks, structural stock, containers, boxes etc.), that can be rolled on rollers and have a flat supporting surface. There exist two types of roller-track conveyor: drive and non-drive. Drive roller-track conveyors have rollers that are rotated by the engine and report the movement of loads lying on. Non-drive conveyors move under the influence of the driving force and rotated pulleys. Also roller-track conveyors are: with cylindrical rollers and disk. Advantage disk before cylindrical rollers is that they can ensuring smooth running of loads at the expense of axis of disk rollers arranged alternate, can be mounted closer to each other. Nowadays roller-track conveyors used in rolling rooms, factories, producing cutting and nesting pattern sheet of metal and profiles, at woodworking factories.

A vibrating conveyor is a machine with a solid conveying surface which is turned up on the side to form a trough. They are used extensively in food grade applications where sanitation, wash down, and low maintenance are essential. Vibrating conveyors are also suitable for harsh, very hot, dirty, or corrosive environments. They can be used to convey newly cast metal parts which may reach upwards of 1,500 °F (820 °C). Due to the fixed nature of the conveying pans vibrating conveyors can also perform tasks such as sorting, screening, classifying and orienting parts. Vibrating conveyors have been built to convey material at angles exceeding 45° from horizontal using special pan shapes. Flat pans will convey most materials at a 5° Incline from horizontal line.

The Archimedes screw, also known as Archimedes' screw, the Archimedean screw or the screw pump is a machine historically used for transferring water from a low-lying body of water into irrigation ditches. It was one of several inventions and discoveries traditionally attributed to Archimedes in the 3rd century BCE. The Archimedes ‘screw consists of a screw inside a hollow pipe. The screw is turned usually by a windmill or by manual labor. As the bottom end of the tube turns, it scoops up a volume of water. This amount of water will slide up in the spiral tube as the shaft is turned, until it finally pours out from the top of the tube and feeds the irrigation systems. It was mostly used for draining water out of mines. The contact surface between the screw and the pipe does not need to be perfectly water-tight because of the relatively large amount of water being scooped at each turn with respect to the angular frequency and angular speed of the screw. Also, water leaking from the top section of the screw leaks into the previous one and so on, so a sort of mechanical equilibrium is achieved while using the machine, thus limiting a decrease in mechanical efficiency. In some designs, the screw is fixed to the casing and they rotate together instead of the screw turning within a stationary casing. A screw could be sealed with pitch resin or some other adhesive to its casing, or, cast as a single piece in bronze, as some researchers have postulated as being the devices used to irrigate the Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World. Depictions of Greek and Roman water screws show the screws being powered by a human treading on the outer casing to turn the entire apparatus as one piece, which would require that the casing be rigidly attached to the screw. Along with transferring water to irrigation ditches, this device was also used for reclaiming land from under sea level in the Netherlands and other places in the creation of polders. A part of the sea would be enclosed and the water would be pushed up out of the enclosed area, starting the process of draining the land for use in farming. Depending on the length and diameter of the screws,

more than one machine could be used to successively lift the same water. An Archimedes screw was used by British soils engineer Dr. John Bur land in the successful 2001 stabilization of the Leaning Tower of Pisa. Small slivers of subsoil saturated by groundwater were removed from far below the north side of the Tower, and the weight of the tower itself corrected the lean. Archimedes screws are used in sewage treatment plants because they cope well with varying rates of flow and with suspended solids. An auger in a snow blower or grain elevator is essentially an Archimedes screw. The principle is also found in pescalators, which are Archimedes screws designed to lift fish safely from ponds and transport them to another location. This technology is primarily used at fish hatcheries as it is desirable to minimize the physical handling of fish.

Screw conveyors have been a popular material handling mechanism throughout history. One type of screw conveyor, perhaps the best known is the Archimedes screw contained within a tube to raise water. They are used in many bulk handling industries. Screw conveyors in modern industry are often used horizontally or at a slight incline as an efficient way to move semi-solid materials, including food waste, wood chips, aggregates, cereal grains, animal feed, boiler ash, meat and bone meal, municipal solid waste, and many others. In industrial control applications the conveyor may be used as a variable rate feeder to deliver a measured rate or quantity of material into a process. Screw conveyors can have greater pitch spacing, resulting in a higher capacity without an increase in rotation speed. They usually consist of a trough or tube containing either a spiral coiled around a shaft, driven at one end and held at the other, or a Shaft less Spiral, driven at one end and free at the other. Screw conveyors can be operated with the flow of material inclined upward. When space allows, this is a very economical method of elevating and conveying. It is important to understand, however, that as the angle of inclination increases, the allowable capacity of a given unit rapidly decreases.

Belt conveyor systems are used as components in automated distribution and warehousing. In combination with computer controlled pallet handling equipment this allows for more efficient retail, wholesale, and manufacturing distribution. It is considered a labor saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with less labor expense. 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), or bags of product that would sag between rollers. Belt conveyors are generally fairly similar in construction consisting of a metal frame with rollers at either end of a flat metal bed. The belt is looped around each of the rollers and when one of the rollers is powered (by an electrical motor) the belting slides across the solid metal frame bed, moving the product. In heavy use applications the beds 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. Belt conveyors can now be manufactured with curved sections which use tapered rollers and curved belting to convey products around a corner. These conveyor systems are commonly used in postal sorting offices and airport baggage handling systems. A sandwich belt conveyor uses two conveyor belts, face-to-face, to firmly contain the item being carried, making steep incline and even vertical-lift runs achievable.

Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive. Product is conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. These conveyors should use only the highest quality premium belting products, which reduces belt stretch and results in less maintenance for tension adjustments. Belt conveyors can be used to transport product in a straight line or through changes in elevation or direction. In certain applications they can also be used for static