Bulk-Handling Conveyors

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BULK-HANDLING CONVEYORS

Lesson One

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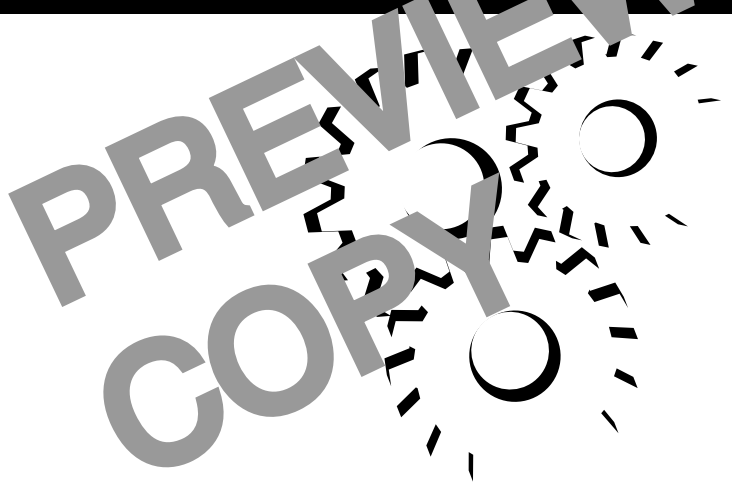


TPC Training Systems

33101

Lesson

1 Conveyor Components

TOPICS

Conveyor Profiles
Conveyor Pulleys
Conveyor Idlers
Bulk-Handling Conveyor Belts
Conveyor Drive Packages
Support Components

OBJECTIVES

After studying this Lesson, you should be able to…

- Describe the basic operation of a bulk-handling belt conveyor and identify its major components.
- Name and explain the function of the different pulleys used in belt conveyors.
- Describe four popular conveyor drive-package arrangements.
- Explain the purpose and the operation of at least four of the support components of a bulk-handling belt conveyor.

KEY TECHNICAL TERMS

Profile 1.01 a diagram showing the location of components and other details of a belt conveyor system

Head end (head-pulley end) 1.02 in most installations, that end of a belt conveyor at which material is discharged

Tail section (tail-pulley end) 1.03 the point at which material is loaded onto the conveyor belt

Angle of wrap (arc of contact) 1.13 the portion of a pulley's circumference that is in contact with a conveyor belt

Tractive effort 1.13 amount of force needed for a pulley to move a belt

Takeup 1.17 the process of tensioning a belt by taking up the slack

Belt conveyors are divided into two general classes. Those which carry boxes, crates, or packaged goods are called unit conveyors, and are usually designed for light to medium loads. The other type of conveyor handles materials in bulk form, such as coal, sand, gravel, grain, and similar loose products. It is the latter type of conveyors—bulk-handling belt conveyors—that you will be studying in this Unit.

This Lesson presents the basic terminology of bulk-handling belt conveyors. You will read about the major components of a bulk-handling conveyor system and the functions of each. The Lesson will also point out the locations and operating principles of specialized components and alarm systems.

Conveyor Profiles

1.01 The *profile* of a belt conveyor is a diagram that shows the locations of the various pulleys, the direction of belt travel, and other specifics of the system. Before working with or on a belt conveyor, obtain a copy of the profile for the system. Learn the location of the various pulleys and other components.

1.02 Figure 1-1 shows a simple two-pulley arrangement. This profile also indicates which side of the belt is carrying the load and which side is unloaded. The *head-pulley end,* or the *head end,* of a belt conveyor is usually the point of discharge of the material from the belt. It may also be (as it is in Fig. 1-1) the location of the drive package that powers the conveyor.

1.03 The *tail-pulley end,* or the *tail section,* of a belt conveyor is the end at which the material is loaded onto the belt. In many simple systems, the tail section is also the location of the devices that maintain proper tension on the belt and help keep the belt aligned on the pulleys.

1.04 The conveyor represented by the profile in Fig. 1-1 is a *horizontal conveyor*. The distance between the centers of the drive pulley and the tail pulley is called the *center distance.* It can vary from a few feet to hundreds of feet, depending on installation and design factors.

1.05 The conveyor shown in Fig. 1-2 is more complex. Here several pulleys are used so that the drive pulley can be located some distance away from the head, or discharge, end of the conveyor. Profiles similar to this one are often used on heavy-duty conveyors when the head pulley is *cantilevered*—that is, when it projects beyond the main supporting structure. A heavy-duty conveyor requires a correspondingly heavy drive package. If that drive package were at the cantilevered head

Fig. 1-1. Belt conveyor profile

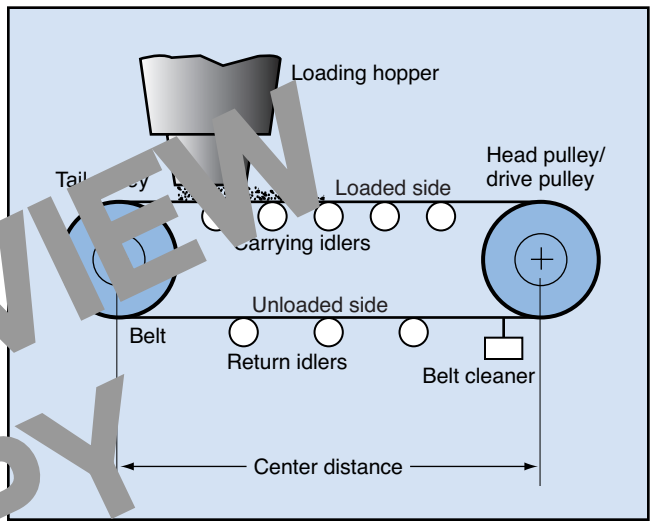


Fig. 1-2. Conveyor with separate head and drive pulleys

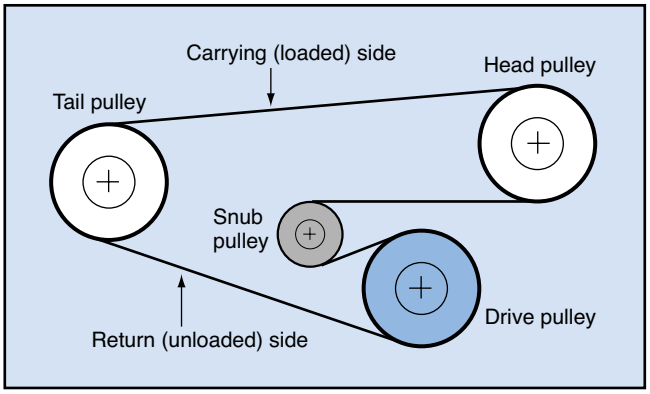


Fig. 1-3. Drum pulley

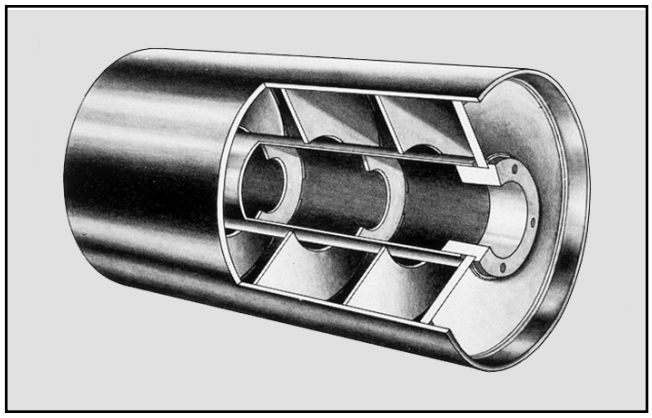
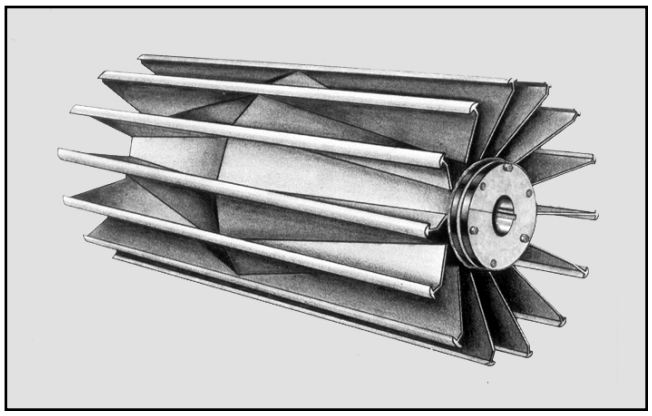


Fig. 1-4. Wing pulley



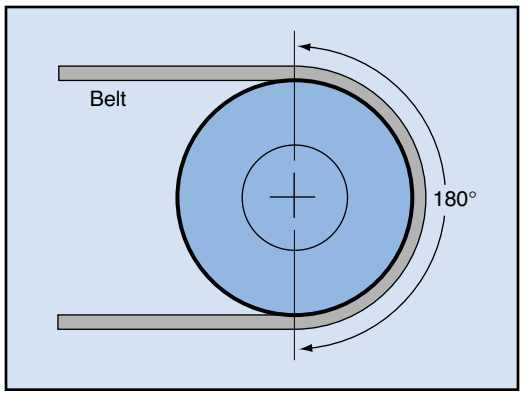
pulley, it would overload the structural members of the conveyor.

1.06 Notice that the conveyor in Fig. 1-2 is carrying the load up a slight incline. Belt conveyors with horizontal profiles (Fig. 1-1) move a quantity of bulk material from one location to another in a straight line. *Inclined conveyors* not only move the load in a straight line, they also raise or (rarely) lower it from the loading point to a different level.

1.07 The major components of a belt conveyor are:

- pulleys
- idlers
- the belt
- the drive package.

Fig. 1-5. Angle of wrap



Conveyor Pulleys

1.08 In bulk-handling conveyors, a pulley is usually identified primarily by its location within the system and by its type. More specific features, however, such as pulley diameter, face width, bore size, and certain other physical characteristics are also included in the pulley's description.

1.09 **Head pulley.** The profile in Fig. 1-1 represents one of the simplest designs for a bulk-handling system. The *head pulley* in Fig. 1-1 serves a dual purpose. It supports the belt at the head, or discharge, end of the conveyor (which establishes its identifying position) and also acts as the drive pulley.

1.10 **Drive pulley.** The *drive pulley* moves the belt, since the pulley is connected to the drive package. As you have read—and seen in Fig. 1-1 and Fig. 1-2—the drive pulley may be the same component as the head pulley or it may be a separate pulley located elsewhere in the conveyor system.

1.11 Head and drive pulleys are usually of the drum type. *Drum pulleys* (Fig. 1-3) get their name from the fact that they look like an oil drum, although their construction is stronger and much more complex. Drum pulleys are the type most commonly used in bulk-handling systems, not only as head pulleys—but in other locations as well. *Crown pulleys,* or *crown-faced pulleys,* are drum pulleys whose diameter is somewhat greater at the center than at either end. This shape increases the tension on the center of the belt, which helps to keep it aligned.

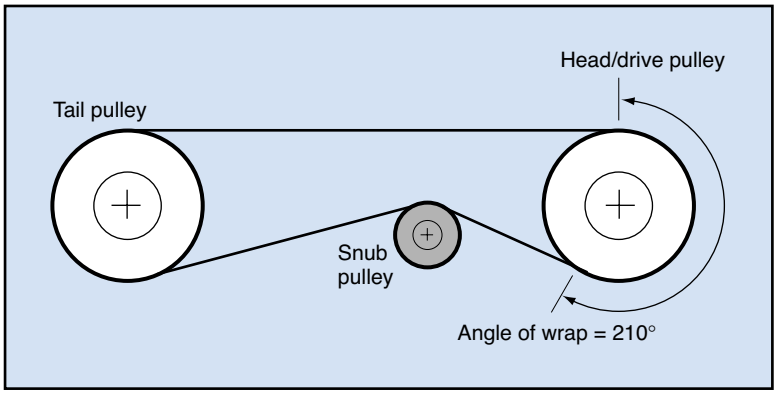
1.12 **Tail pulley.** A *tail pulley* can be either a drum type or a wing type, such as the one shown in Fig. 1-4. *Wing pulleys* are used when operating conditions are dirty or when abrasives are carried on the belt. The wing-pulley design helps to keep the material being handled from building up between the belt and the pulley at the loading point. The material falls between the radial slats, or wings, of the pulley.

1.13 **Snub pulley.** Figure 1-5 shows a belt wrapped on a conveyor drive pulley. The belt contacts the pulley on half of the pulley's circumference, This 180° of contact is called the *angle of wrap.* Another name, *arc of contact,* is sometimes used. The angle of wrap has a definite effect on the amount of force required for the pulley to make the belt move (the *tractive effort*). If the angle of wrap is too small, the belt will slip.

1.14 In Fig. 1-6 a smaller-diameter drum pulley called a *snub pulley* is installed near the driver. The purpose of this pulley is to *snub* the belt upward, thereby increasing the angle of wrap of the belt on the drive pulley. This increases the tractive effort and reduces the chance of belt slippage at the drive end. You will usually find the snub pulleys in a system located next to the driver, regardless of the driver's location.

1.15 The diameters of snub pulleys must be selected carefully. If the pulley is too small, it will bend the belt (*back-flex* the belt) sharply, possibly causing damage to the belt cover and tension members.

Fig. 1-6. Use of snub pulley



1.16 **Bend pulley.** *Bend pulleys* are used to change the direction of belt travel on bulk-handling conveyors. Several of these pulleys are shown in Fig. 1-7. Like snub pulleys, they are relatively small in diameter. Bend pulleys are usually of the drum type.

1.17 **Takeup pulley.** Proper tension on the belt must be maintained at all times. The tension must be applied when the belt is installed. The tension is adjusted periodically to compensate for normal belt stretch. This belt tensioning process is usually referred to as *takeup,* since it involves taking up any excess slack in the belt.

1.18 Notice that the bend pulley closest to the drive pulley in Fig. 1-7 changes the direction of the belt as it comes off the drive pulley. The belt is diverted downward to wrap the *takeup pulley.* This pulley is attached to a weight (*weighted takeup*) or

Fig. 1-7. Using bend pulleys

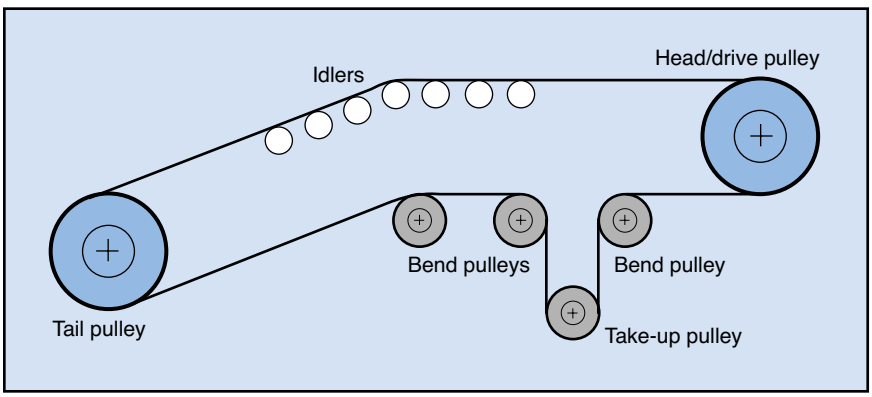
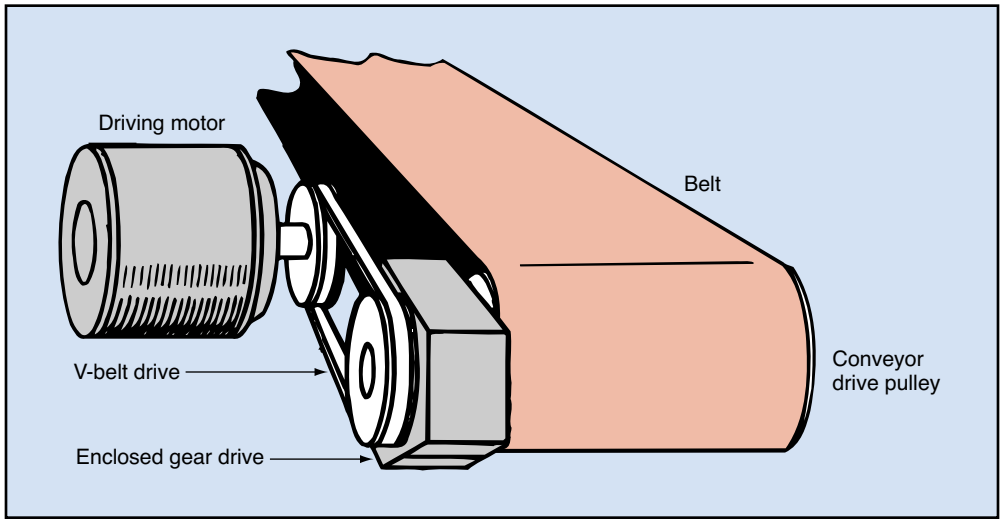


Fig. 1-8. Shaft-mounted conveyor drive



mounted in an adjustable frame. The proper tension is maintained on the belt by varying the weight on the takeup pulley or by adjusting the mechanism in the frame.

1.19 **Lagged pulley**. Most heavy-duty, bulk-handling conveyors use pulleys of welded steel. Some applications require that the rims (O.D.s) of certain pulleys in the system be covered with a different material to provide better traction and protect the belt from excessive wear. The materials most often used for this purpose are rubber, neoprene, and urethane. These nonmetallic coatings are called *lagging*, and a pulley coated with one of them is said to be *lagged.*

Conveyor Idlers

1.20 *Carrier idlers* support the belt and its load between the loading point and the discharge end of the conveyor. Return idlers are used to guide and support the belt on the return side.

1.21 Some idlers of special design are used to help align the belt on the pulleys and absorb high impacts that could damage the belt at the loading point. Note in Fig. 1-7 that a series of idlers supports the belt at the curve between the inclined and the horizontal stretches. Note also in Fig. 1-16 (see page 14) that idlers raise the edges of the belt to help prevent spillage. This function is called *troughing.*

Bulk-Handling Conveyor Belts

1.22 The belt of a conveyor takes more abuse than any other component. It must withstand abrasion from gritty materials (sand, gravel, coal dust, etc.) and still provide long service life. It must withstand the cutting action of sharp objects, such as jagged pieces of stone or ore, and still carry the required amounts of materials at the design load capacity.

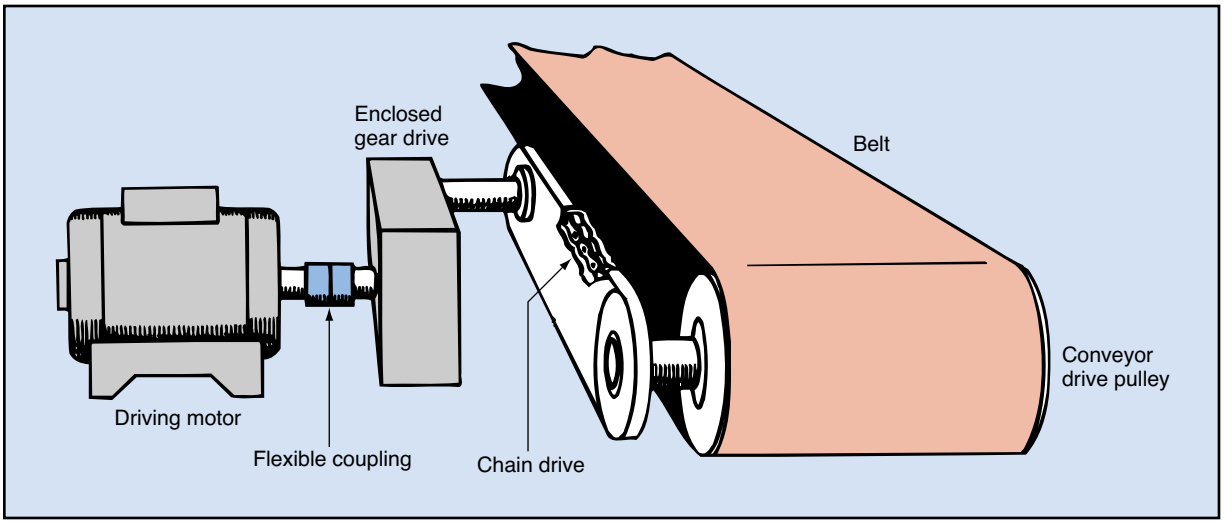
1.23 Bulk-handling conveyor belts commonly have a core of fabric cords or steel cables surrounded by a rubber or plastic cover. Storing, handling, splicing, and repairing the belts are critical operations. Belts will be covered in greater detail in Lesson Two.

Conveyor Drive Packages

1.24 Belt conveyors are most often driven by electric motors. Alternating current (ac) motors are made to operate at certain fixed speeds. The speed required for the belt in a conveyor may not be the same as that of the driving motor. The motor speed must then be adjusted by some external means to suit the installation.

1.25 This speed adjustment is accomplished by a drive package consisting of the motor, an enclosed gear drive for speed reduction, and drive accessories. These components can be combined in many ways,

Fig. 1-9. Parallel-shaft drive package

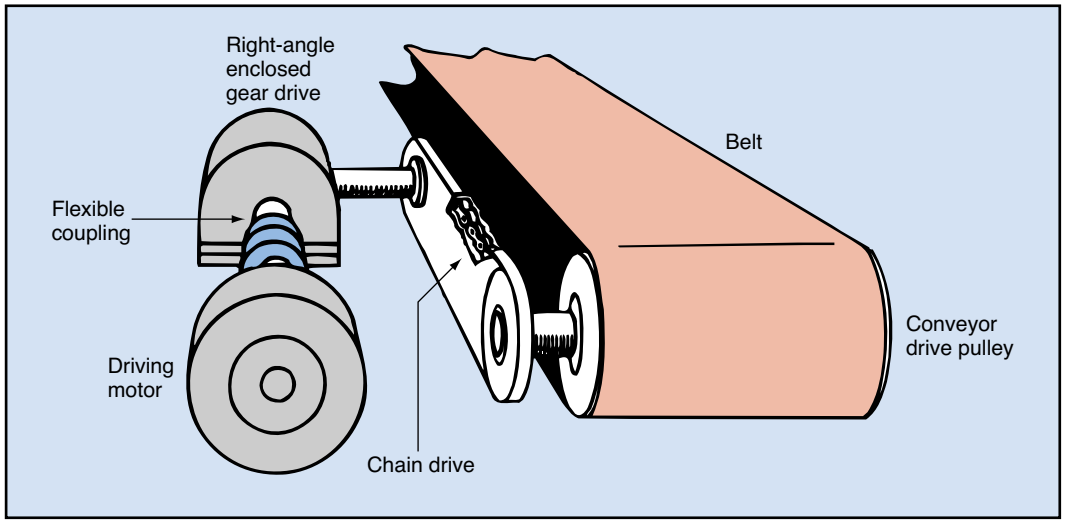


depending on the requirements of the installation. The following arrangements are some of the most popular drive packages for belt conveyors.

1.26 **Shaft-mounted conveyor drive.** The drive package diagrammed in Fig. 1-8 consists of a V-belt drive from the motor shaft to the input shaft of an enclosed gear drive, which is mounted on the shaft of the drive pulley. Part of the required overall speed reduction from the motor to the conveyor drive shaft is absorbed in the V-belt drive. Note that the V-belt sheave on the enclosed gear drive is larger than that on the motor. The remainder of the total reduction is taken by the enclosed gear drive.

1.27 If a different speed is desired at the conveyor drive shaft, you can change the ratio of the V-belt drive simply by changing sheave diameters. The speed ratio of the enclosed gear drive is fixed and is not easily changed in the field. The drive system represented in Fig. 1-8 is used on light- to medium-duty conveyors when speed flexibility is desired. The arrangement takes up slightly more space than others, but is an efficient, flexible package.

Fig. 1-10. Right-angle drive package



1.28 **Parallel-shaft drive package.** Figure 1-9, on the previous page, is a diagram of a popular drive arrangement for heavy-duty belt conveyors. Here, an enclosed gear drive is coupled directly to the driving motor. A chain drive connects the enclosed gear drive to the drive shaft of the conveyor. Note that all shafts are parallel.

1.29 The gear drive, as was noted earlier, is not easily adaptable to future belt speed changes. If necessary, however, you can change the final output speed (speed of the conveyor drive shaft) by simply changing the diameter of one of the sprockets in the chain drive.

1.30 **Right-angle drive package.** The drive package in Fig. 1-9 uses an enclosed gear drive with an output shaft parallel to that of the motor. Compare that setup with the right-angle configuration shown in Fig. 1-10, on the previous page. The latter makes a more compact package for installations in which space is limited.

1.31 **Fluid-coupling drive**. Large-capacity belt conveyors must sometimes be started under load—that is, with the belt fully loaded with coal, ore, or other heavy materials. In these cases, another component is added to the drive system. A fluid coupling installed between the motor and the enclosed gear drive permits the motor to get up to its normal operating speed while it gradually takes on the heavy load of the conveyor.

The Programmed Exercises on the next page will tell you how well you understand the material you have just read. Before starting the exercises, remove the REVEAL KEY from the back of your Book. Read the instructions printed on the Reveal Key. Follow these instructions as you work through the Programmed Exercises.

1-1. The end of a belt conveyor at which the material is discharged is the _____.	1-1. HEAD-PULLEY END or HEAD END Ref: 1.02
1-2. The major components of a belt conveyor are pulleys, the belt, idlers, and the _____.	1-2. DRIVE PACKAGE Ref: 1.07
1-3. The drive pulley is always the same as the head pulley. True or False?	1-3. FALSE Ref: 1.10
1-4. Head and drive pulleys are usually of the _____ type, while tail pulleys can be either drum or _____ type.	1-4. DRUM; WING Ref: 1.11, 1.12
1-5. The purpose of a snub pulley is to increase the angle of _____ on the drive pulley.	1-5. WRAP Ref: 1.14
1-6. Proper tension on the conveyor belt is maintained by adjusting the _____ pulley.	1-6. TAKEUP Ref: 1.18
1-7. Bulk-handling conveyor belts usually have a core of fiber cords or _____.	1-7. STEEL CABLES Ref: 1.23
1-8. What is the purpose of the enclosed gear drive in the drive package?	1-8. ADJUST MOTOR SPEED TO DESIRED CONVEYOR SPEED Ref: 1.24-1.25

Support Components

1.32 Other items in the system are considered to be more or less support components, but they are necessary for the efficient operation of the installation. The following are among the major support components:

- belt-cleaning devices
- bearings and takeup units
- feed and discharge devices
- alarms and safety devices
- alignment aids
- speed sensors
- backstops.

1.33 **Belt-cleaning devices.** Bulk-handling conveyor systems usually operate outdoors or under a minimum of shelter. The materials carried are often in a fine powdery or granular state. When mixed with water, these materials form a mudlike substance on the belt and around the pulleys. These circumstances require constant cleaning of the belt during operation to prevent excessive buildup of the damaging substances.

1.34 Figure 1-11 shows one type of belt cleaner. A motor-driven rotating brush scrubs the dirty side of the belt as the belt leaves the head pulley after discharging its load. Pressure of the brush against the belt is adjustable. The speed of the brush may also be regulated to suit the operating conditions of the conveyor system.

1.35 **Bearings and takeup units.** Each pulley in a belt conveyor is mounted on its own shaft, regardless of the type of pulley it is. The shafts must be supported on bearings that can handle the loads imposed on the belt and pulleys. The bearings may be ball, roller, spherical, or tapered roller, depending on the application and their location within the conveyor system.

1.36 Certain types of bearings are included in adjustable units that maintain proper tension on the belt and take up any excessive belt slack. Figure 1-12 shows a typical takeup bearing assembly mounted in its frame at the tail end of a belt conveyor. Adjustment of the bearing is made in the direction of the arrow, and is accomplished by turning the adjusting screw in the bearing frame.

1.37 When the bearing shown in Fig. 1-12 moves to the right, it tightens the belt until the desired tension is obtained. You must make an equal adjustment on the opposite side to maintain alignment of the belt. Conveyors used for heavier service may have a similar arrangement, except that the bearing is made to move

Fig. 1-11. One type of conveyor belt cleaner

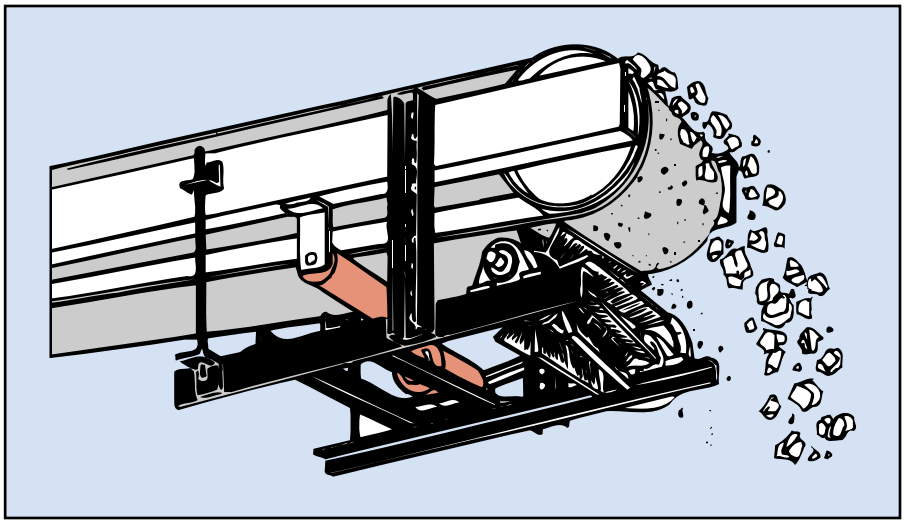
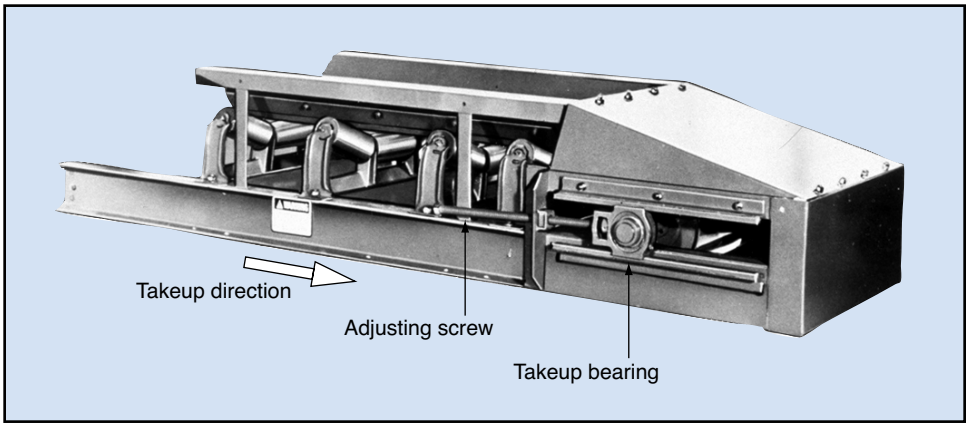


Fig. 1-12. Conveyor takeup bearing



by adding weight to the pulley shaft, as shown in Fig. 1-13. Other systems use hydraulic pressure to move the pulley, shaft, and bearing for belt tensioning.

1.38 Shafts of pulleys that are not used for takeup are supported by bearings mounted in pillow blocks that are securely fastened to the conveyor frame. Although bearings and takeups are considered support items, their performance on the conveyor critically affects the operation of the system.

1.39 Some belt conveyors require special seals on the bearings to keep out dust, dirt, and other contaminants while keeping the bearing lubricant within the housing. An example of this type of application is a belt conveyor handling coal. The dust given off by the coal as it is moved by the conveyor is a fine, gritty substance. If the dust is allowed to enter the bearing housing, it will mix with the oil or grease within. The compound thus formed will rapidly wear the internal parts of the bearing.

1.40 **Feed and discharge devices.** In most applications, the material to be carried by a conveyor is loaded onto the belt from a hopper or from a feeder conveyor. The flow of the material onto the moving belt must be controlled to reduce waste and spillage. There are several methods of providing this control.

Fig. 1-13. Typical horizontal weighted takeup arrangement

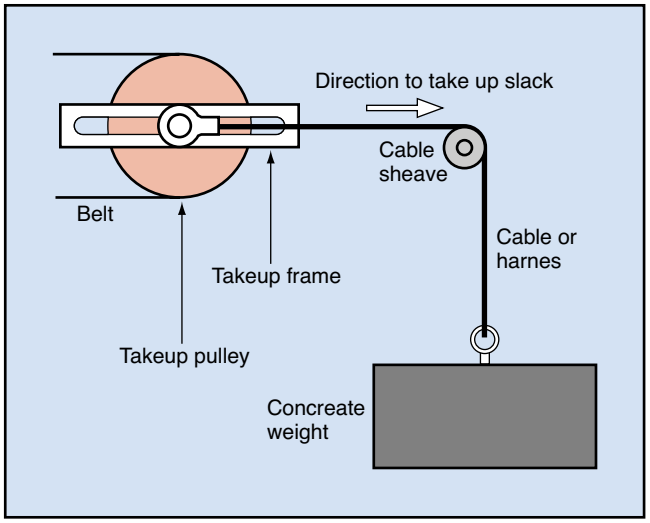


Fig. 1-14. Typical loading arrangement

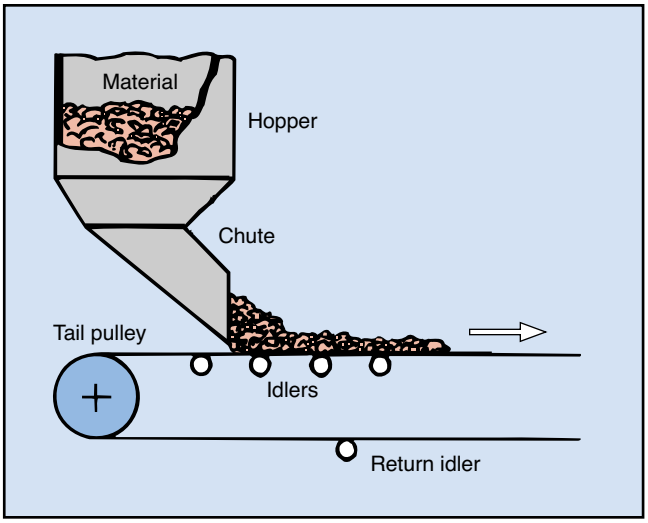
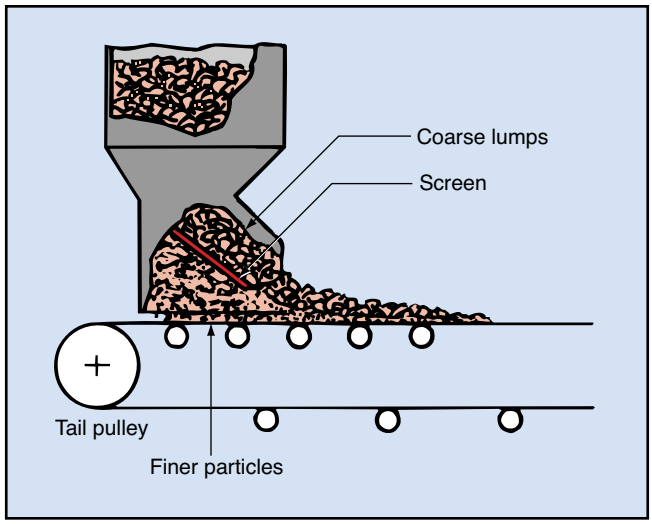


Fig. 1-15. Screen-type loading system



1.41 Figure 1-14 on the previous page shows a typical loading arrangement. The material is stored in the hopper. When loading begins, a valve or other mechanism is opened. The material then flows from the hopper into the loading chute and onto the belt. Notice the four closely spaced idlers under the belt at the chute outlet. These *impact idlers* are designed to help absorb the high-impact loads of heavy, coarse lumps of material dropping on the belt.

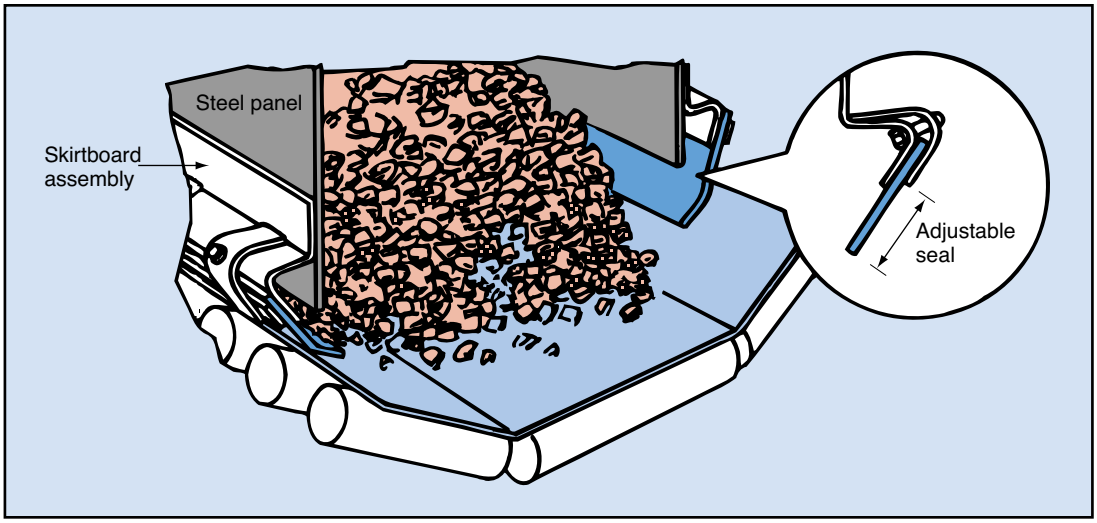
1.42 Figure 1-15 shows a loading arrangement for installations in which the conveyed material is made up of fine particles and coarser lumps. In this hopper-and-chute system, the finer particles drop through a screen, which acts like a sieve, and drop on to the belt ahead of the coarser lumps. The bed of *fines* then acts as a cushion, helping to soften the impact on the belt when the heavier lumps drop. The material in the loading hopper must be kept in a loose, free-flowing state.

1.43 Moisture and humidity can cause caking or lumping up of finer materials, such as sand, sawdust, and cement, thus preventing the free flow of material. Conveyor hoppers frequently include aerators to prevent these conditions. An aerator, usually mounted on the inside wall of a hopper, directs a stream of low-pressure air into the stored material. This stream of air keeps the material loose and free flowing. The same result can be achieved by installing vibrators or sonic devices.

1.44 *Skirting (skirtboards)* reduces spillage of material at the point where it is loaded onto the moving belt. Skirting cuts waste in applications involving such materials as foodstuffs or chemicals, which are unusable if they fall from the conveyor. Figure 1-16 shows a typical skirtboard arrangement. Rubber seals are held between evenly spaced clamps. They are adjustable upward or downward for proper positioning and to compensate for seal wear.

1.45 The rubber seals are replaceable. Removal and installation are relatively simple operations. The skirt-

Fig. 1-16. Typical skirtboard arrangement



board assembly of clamps and seals is mounted on steel panels, which are usually lined with an abrasion-resistant material. Rubber is the most common liner, although other materials are used for special applications. You should adjust skirtboards as needed to keep a proper closure where the seal contacts the belt.

1.46 Made of steel tubes, *spouting* is frequently used to direct the flow of materials discharged from a belt conveyor. Some materials—grain, for example—must be stored in bins. Two or more storage bins are filled in sequence as the conveyor operates. The material is discharged into one large spout, which branches off into separate spouts for each storage bin.

1.47 The material's flow direction is controlled through a system of gates. The gates may be opened or closed to various degrees, diverting the material from one spout and bin to others at a controlled rate.

1.48 Many materials handled by bulk belt conveyors give off a considerable amount of dust, particularly at loading and discharge points. With such materials as coal and cement, for instance, special measures must be taken to keep the dust to a minimum for environmental and safety reasons.

1.49 Figure 1-17 shows how a *telescoping chute* is installed at the discharge end of a belt conveyor handling dusty materials. If the material were simply dropped off the end of the conveyor belt onto the pile, it would generate clouds of dust. A telescoping chute, opened to its full position as unloading starts, prevents this condition. As the pile of material grows higher, section A is retracted to enclose section B. When the pile reaches the bottom of the telescoped sections, they are further retracted to encase section C.

1.50 The dusty material is always enclosed inside the telescoping sections and prevented from entering the atmosphere. You must maintain a telescoping chute so that the sections operate freely. A mechanical drive arrangement moves the sections. Therefore, binding can cause damage to the drive system or the sections.

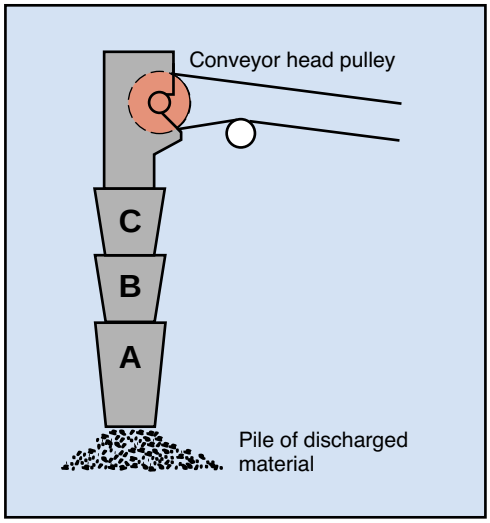
1.51 **Alarms and safety devices.** Because they are usually loaded heavily and move at high speeds, bulk-handling belt conveyors are generally classified as dangerous equipment. They are often used to transport hazardous and volatile substances. For these reasons, many sophisticated mechanisms and systems have been developed to protect the operating personnel and the environment. These devices should never be bypassed or rendered inoperable on any conveyor system.

1.52 An overloaded belt conveyor can cause considerable damage to equipment and injury to operating personnel. Devices for sensing an overload condition and acting upon the warning are usually installed in motor-control circuits, on the conveyor shafts, or in the drive package. Some of these will shut the system down if they sense an overload. Some will sound an alarm. Some will cause slippage, stopping the flow of mechanical power to the conveyor, Others will combine two or more of these responses.

1.53 **Alignment aids.** Conveyor belts have a tendency to "wander" away from a straight-line path between the head and tail pulleys. Wandering is particularly common on conveyors with long center distances. This sideways travel of the belt rapidly wears its edges, thereby greatly reducing the belt's life. Besides crown pulleys, mentioned earlier, there are several other effective ways to compensate and correct for tracking problems.

1.54 *Training idlers* can be installed at periodic intervals along the belt to "train" it back into alignment between head and tail pulleys. Another device used to

Fig. 1-17. Telescoping discharge chute



control belt wandering is called an *alignment switch.* Alignment switches are electromechanical units mounted in pairs on both sides of the belt. When the belt moves sideways in either direction, the edge contacts a vertical roller on the device. The roller moves inward slightly, actuating a switch that sounds an alarm to warn operating personnel of a tracking problem.

1.55 **Speed sensors.** A belt conveyor can stop unexpectedly for many reasons. In a serious overload, for example, chunks of rock or other material can jam between the moving conveyor parts and the supporting structure. An electrical power failure or a failure in a drive-package component can also cause a stop.

1.56 Operating personnel of a feeder conveyor may not know that the conveyor they are feeding has shut down unpredictably. If they continue to operate their conveyor, there will be a severe pileup of material at the loading point of the stopped conveyor.

1.57 Motion sensors are used in many conveyor systems to sense stops and warn personnel. These are often called *zero-speed* switches. The sensor is usually connected to the end of the drive-pulley shaft opposite the conveyor drive package. As long as the sensor "feels" the motion of the drive shaft, it permits the conveyor to run. If the drive shaft stops for any reason other than a manually controlled stop, the sensor will shut off the power to the conveyor.

1.58 **Backstops.** A backstop is another safety device for belt conveyors. It is found primarily on inclined conveyors, where an unexpected loss of power could allow the loaded conveyor to run backwards down the incline, with disastrous results. Most *backstops* are mechanical devices with a cam system that allows rotation of the conveyor pulleys in one direction only.

1.59 In some installations, the backstop may be mounted in the gear drive. More often, however, the units are mounted separately and are attached to the shaft of the head pulley of an inclined conveyor. Careful maintenance of these components is critical to ensure that they operate correctly when needed.

1.60 Regardless of the type or purpose of the safety devices used in your conveyor system, remember that they are very important to safe operation. Never operate a conveyor without them or attempt to bypass the units for convenience.

1-9. You can prevent buildup of mudlike substances on the belt by installing a(n) _____ device.	1-9. BELT-CLEANING Ref: 1.33,1.34
1-10. Shafts of non-takeup pulleys are supported by bearings mounted in _____.	1-10. PILLOW BLOCKS Ref: 1.38
1-11. Coal-handling conveyors require special _____ to keep dust out of the bearing housings.	1-11. SEAL Ref: 1.39
1-12. Skirtboards installed at the loading point on the belt reduce _____ of material.	1-12. SPILLAGE Ref:1.44
1-13. To contain excessive dust during conveyor unloading, you can install a(n) _____.	1-13. TELESCOPE SYSTEM or TELESCOPING CHUTE Ref: 1.49, 1.50
1-14. Training idlers are installed to correct conveyor belt _____.	1-14. WANDERING Ref: 1.53,1.54
1-15. What device prevents a loaded inclined conveyor from running backwards if power is lost?	1-15. BACKSTOP Ref: 1.58,1.59
1-16. Safety devices in a conveyor system should never be _____.	1-16. BYPASSED Ref: 1.51,1.60

Answer the following questions by marking an "X" in the box next to the best answer.

1-1. Material is usually loaded onto a belt conveyor at the

- ☐ a. tail section
- ☐ b. head end
- ☐ c. snub side
- ☐ d. idler end

1-2. Which of the following are major components of a bulk-handling conveyor system?

- ☐ a. Bearings
- ☐ b. Idlers
- ☐ c. Discharge devices
- ☐ d. Speed sensors

1-3. The drive pulley of a conveyor system is

- ☐ a. always the same as the head pulley
- ☐ b. always located separately
- ☐ c. sometimes the same as the head pulley
- ☐ d. always the same as the tail pulley

1-4. If the diameter of a snub pulley is too small,

- ☐ a. excessive rotational speed causes failure
- ☐ b. it back-flexes the belt sharply
- ☐ c. it does not support the belt adequately
- ☐ d. the arc of contact is too small

1-5. The nonmetallic protective coating applied to some pulley O.D.s is called

- ☐ a. flux
- ☐ b. skirting
- ☐ c. tractive coat
- ☐ d. lagging

1-6. What is the simplest way to change the output speed of a conveyor drive package?

- ☐ a. Adjust the electric motor speed
- ☐ b. Add a fluid coupling to the drive
- ☐ c. Change sheave or sprocket diameters
- ☐ d. Change gears in the enclosed gear drive

1-7. Which of the following drive packages should be used if a large-scale conveyor system must be started under full load?

- ☐ a. Fluid-coupling drive
- ☐ b. Shaft-mounted drive
- ☐ c. Right-angle drive package
- ☐ d. Parallel-shaft drive package

1-8. When a conveyor system includes an adjustable bearing frame, the assembly is used for belt

- ☐ a. splicing
- ☐ b. cleaning
- ☐ c. training
- ☐ d. tensioning

1-9. The purpose of skirting in a conveyor system is to

- ☐ a. prevent dust
- ☐ b. reduce spillage
- ☐ c. reduce loading impact
- ☐ d. clean the belt

1-10. Which device or method is used to fill two or more bins in sequence from a conveyor?

- ☐ a. Spouting
- ☐ b. A telescoping chute
- ☐ c. Troughing
- ☐ d. A feeder conveyor

SUMMARY

The major components of a bulk-handling belt conveyor are the belt, pulleys, idlers, and a drive package. The head and tail pulleys support the belt at the discharge end and at the loading end, respectively. The drive pulley moves the belt. Snub pulleys increase the angle of wrap on the drive pulley, bend pulleys change the direction of the belt travel, and takeup pulleys maintain belt tension. Lagged pulleys are coated—usually with rubber or plastic—for better traction.

Idlers support the belt between the loading end and the discharge end. Drive packages consist of a motor, an enclosed gear drive for speed reduction, and drive accessories. These components are combined differently according to the requirements of the installation. A fluid coupling is added when the belt must be started under full load.

Support components of a belt conveyor system include belt-cleaning devices, bearing and take-up units, feed and discharge devices, alarms and safety devices, alignment aids, speed sensors, and backstops.

Answers to Self-Check Quiz

1-1. a. Tail section. Ref: 1.03

1-2. b. Idlers. Ref: 1.07

1-3. c. Sometimes the same as the head pulley. Ref: 1.10

1-4. b. It back-flexes the belt sharply. Ref: 1.15

1-5. d. Lagging. Ref: 1.19

1-6. c. Change sheave or sprocket diameters. Ref: 1.26, 1.27

1-7. a. Fluid-coupling drive. Ref: 1.31

1-8. d. Tensioning. Ref: 1.36, 1.37

1-9. b. Reduce spillage. Ref: 1.44, 1.45

1-10. a. Spouting. Ref: 1.46

Contributions from the following sources are appreciated:

Figure 1-3. Precision Pulley, Inc.
Figure 1-4. Precision Pulley, Inc.
Figure 1-11. Conveyor Components Company
Figure 1-12. Barber-Greene Company