

## GLOSSARY OF TERMS

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### **BACKUP TUBE OR CHANNEL**

The backup tube or channel is a part of the conveyor frame. It runs the length of the frame and provides additional stiffness to the frame assembly. In conveyor sizes 450 and wider, the backup tube/channel provides a support surface for the T-bar.

Depending on the type of frame structure being used, this may be a square tube, or a C shaped channel.

### **BEARING MOUNT**

The Bearing Mount is a bulkhead between the two side rails of the conveyor. There are typically at least two per meter of length. They determine the frame width (size), provide stiffness, and provide a mounting location for bearings in a line shaft system. They also support and locate the backup tube or channel. Construction is typically sheet steel, formed and welded, although some systems will use extruded aluminum cross members in place of the bulkheads.

### **BEARING**

Shuttleworth uses both ball and plain bearings. Plain bearings will always carry the term “bushing” in the descriptions. “Bearings” will always refer to ball or roller bearings.

### **BELT DRIVE**

Refers to Shuttleworth conveyor utilizing a line shaft along the length of the conveyor to power the transverse roller shafts on the surface of the conveyor. The Drive Belts link the line shaft to the roller shaft.

### **BELTS**

- A. Drive Belts transmit power from a line shaft to a pulley on each roller shaft. Drive Belts are considered a wear item and should be on a spares list. Only applies to Shuttleworth “Belt Drive” systems.
- B. Jump Belts transmit power horizontally from roller shaft-to-roller shaft when it is impractical to obtain power directly from the drive shaft with a drive belt. Jump belts are normally used to power roller shafts at bearing and drive sprocket locations on Shuttleworth “Belt Drive” systems
- C. Timing belts are used in primary power transmission and in Lift and Transfer assemblies.

### **BI-DIRECTIONAL CONVEYOR**

The bi-directional conveyor surface is unique to Slip-Torque<sup>®</sup> conveyor. Instead of requiring individual conveyors to travel in and out of a work cell, Shuttleworth conveyors can be configured with multiple parallel lanes, each travelling one direction or the other, all within one frame.

## GLOSSARY OF TERMS

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### **BUSHING**

Bushing refers to a plain bearing. Most references to Bushing will involve the roller shaft supports. Roller shaft Bushings come in a variety of materials that have been matched to the application.

### **BUSHING COVER**

Bushing cover is a generic term used to describe the upper covers that protect the ends of the roller shafts and the power transmission (line shaft or chain drive) components at the surface. They can be extruded plastic or aluminum, or formed stainless steel. Plastic bushing covers snap onto nibs molded on the bushing holder. Both stainless steel and extruded aluminum bushing covers bolt in place. Another primary function of bushing holder is to keep the bushings locked into the bushing holder.

### **BUSHING HOLDER**

The bushing holder is a molded plastic or stainless steel part that retains the roller shaft bushings along the side rail.

### **BUSHING RETAINER CLIP**

This nickel plated steel clip snaps onto the standard pitch plastic bushing holder over the bushing and is used to hold the bushing in place when a bushing cover cannot be used.

### **CHAIN DRIVE**

Refers to Shuttleworth conveyor powered by a chain (ANSI #25-2) that runs the length of the conveyor. Power is transmitted directly to the roller shafts on the surface by coupling the shaft to the chain via a sprocket. No intermediate power transmission is used. This type of system typically requires less maintenance, but is noisier than a comparable Belt Drive system. Chain Drive systems can also run faster and carry heavier loads, and are better suited to harsh or wet environments.

### **CLEAN GLIDE**

Slip-Trak conveyor designed and tested for Class 1 (Fed 209E) cleanroom environments.

### **CLEAN PASSAGE**

A clean room compatible mini-environment compatible to Fed 209E Class 1 (ISO 3).

### **COARSE PITCH**

Refers to roller center spacing of 37mm (1.458") or 28 shafts per meter. A coarse pitch roller 32mm (1.26" dia.) is implied, but other roller diameters can be used on coarse pitch spacing.

## GLOSSARY OF TERMS

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### **CONTROLS**

“Controls” is a term used by Shuttleworth to indicate the presence of electronic control systems, typically driven by a PLC. Control systems will vary in complexity depending on the customer’s requirements.

### **CORNER GEARBOX**

Transmits power 90° between primary drive train (line shaft or chain). Located in Shuttleworth Slip Torque corner modules when drive power cannot be taken from upstream or downstream conveyor modules.

### **DIVERTER (SWINGER)**

A stand alone pattern forming subsystem that divides one lane of product into multiple lanes. A simple 2-position system might be pneumatically powered, while higher lane counts are servo powered. The Swinger Pattern Former can also be engineered with two parallel infeed lanes.

### **DOUBLE BELTING**

This involves the addition of an extra drive belt on each roller shaft pulley. It is required when the average weight of product on the conveyor surface is more than 2 kg per shaft. Weights in excess of 2 kg/shaft cause slippage between the belt and the pulley and a greatly reduced belt life.

### **DOUBLE DRIVE**

This involves the addition of an extra pulley on the normally idle end of each roller shaft. It is required on a very wide conveyor using Belt Drive.

### **DRIVE MOUNT**

The drive mount houses the motor and primary power transmission components. For Belt Drive systems, this would consist of the timing belt and sprockets to connect the motor & gearbox to the line shaft.

For Chain Drive systems, the chain is part of the primary power transmission system and is directly driven from a sprocket on the gearbox output shaft.

Some drive mount assemblies are configured to power multiple shafts or chains from one motor. Most drive mounts are centered on the frame (laterally), but occasions where the area under the conveyor must be used, a SIDE MOUNT can be engineered.

### **DRIVE SHAFT BEARING**

This special sealed 25mm ball bearing seats in the bearing mount and supports the line shaft.

## GLOSSARY OF TERMS

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### **DRIVE SHAFT**

The Drive Shaft is made of 25mm diameter stainless steel shafting and runs parallel to the side rails and through the bearing mounts. It is held in position by the drive shaft bearings. The drive shaft transmits power from the primary power transmission to the individual roller shafts via drive belts.

### **END TRANSFER**

This is a cantilevered extension of the Slip-Torque<sup>®</sup> conveyor past the end of the side rails. It is frequently used when interfacing with belt type of conveyors to minimize the dead zone between the two conveyors. It consists of special bushing holders, roller shafts, and jump belts. Most if not all the interfaces consist of powered rollers, thus eliminating stalled products. Dead plates are also available and may be warranted if the product is large enough to compare to the gap.

### **FINE PITCH**

Refers to a roller center spacing of 18.5mm (.729"), or (54 shafts per meter) which requires fine pitch rollers 17mm (.670" dia.).

### **FRAME**

Conveyor frames consist of siderails, bearing mounts, and back-up tubes or channels

#### *EASY CLEAN FRAME STYLE*

Easy Clean frames are bolted together with spacers for ease of cleaning. Cross supports are welded tube & plate assemblies, and backup channels are stainless steel C channels. Bushing holders are stainless steel structures and bushing covers are formed stainless steel. The bushing retainers are integral with the bushing holders and not the covers. Covers are designed to be retained, but lifted clear of the drive chain for thorough cleaning.

#### *STAINLESS STEEL FRAME STYLE*

Stainless steel frames are welded together. Bearing mounts are welded to the siderails, and the backup tube is a square tube welded to the bearing mounts. Bushing holders can be plastic or stainless steel as is warranted by the application. Bushing Covers are formed stainless and bolt in place.

#### *EXTRUDED ALUMINUM FRAME STYLE*

Extruded aluminum frames are bolt construction. Bearing mounts are bolted to slots on the inside surface of the extrusion, and the backup channel is a C shaped aluminum extrusion. Bearing mounts are typically painted steel but could be stainless steel. Bushing holders are typically plastic, but could be stainless steel for special applications. Belt drive aluminum frame can use plastic bushing covers (least cost), while chain drive will require formed steel (painted) or formed stainless steel bushing covers.

## GLOSSARY OF TERMS

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### **GUIDE RAIL**

Guide rails fit between the bushing covers and provide additional guiding to products if needed. Construction could be UHMW rail or stainless steel formed sheet. Guides can be mounted with threaded rods for maximum rigidity or can be mounted with quick release knobs for maximum flexibility.

### **GUIDE RAIL BRACKETS**

These support brackets are for attaching and adjusting the guide rail in relation to the conveyor. Brackets could be fixed or adjustable.

### **INDEXER**

An indexer is a special conveyor that singulates products to match them to another type of conveyance. A typical example is releasing single products into a lug chain which in turn feeds a packaging machine. The Shuttleworth Indexer can be configured with a center cut-out at the end to allow conveyor lugs to pass up into the surface to simplify the product transfer. Multiple products or patterns can also be released with an indexer. The Shuttleworth MultiPacker is an example of this application.

### **INDEXING**

The process of separating a single product or a specific number of products from a group of products. A speed change and a product stop are often used to accomplish this.

### **INTERFACE**

Applies to the transfer between the conveyor and the adjoining equipment. Usually implemented as an end transfer, but could also be a side transfer.

### **JOINT KEY**

Joint keys are aluminum bars that are used to connect extruded aluminum frames together. They fit in the T-slots of the extruded side rail.

### **JOINT PLATE**

Steel plates used to connect frames together. Most often refers to Stainless Steel frames or Easy Clean frames, but can be used when joining aluminum frames, especially if they are not the same size or not in line with each other.

### **LEG ASSEMBLY**

Leg assemblies can be tubular steel or extruded aluminum, and support the conveyor sections. They normally consist of legs, adjustable feet, and cross-members. They sometimes are fitted with lateral knee braces for extra rigidity on some systems.

## GLOSSARY OF TERMS

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### **LIFT AND ROTATE**

These devices are used to rotate the product on the conveyor centerline. They are available with pneumatic drives or servo motor drives. Possible rotations are 90° or 180°.

### **LIFT AND TRANSFER**

A device that provides smooth, accurate lateral product transfers from one lane to multiple lanes or from one conveyor elevation to another.

### **LIFT GATE**

Lift gates are hinged sections of Slip-Torque<sup>®</sup> conveyor that easily lift to access work areas. Shuttleworth Lift Gates are counterbalanced and do not require springs for lifting. This increases the safety of the device.

### **LINE PRESSURE**

Line pressure refers to the amount of forward drive the conveyor imparts to the product being conveyed. It is expressed as a percentage. For instance, a product weighing 10 kg (100 lbs.) that is conveyed forward with a force of 600g (6 lbs.) is said to have a line pressure of 6%.

### **LOW PROFILE**

Ergonomic low profile conveyor designed to minimize overall dimensions. The enclosed drive mechanism, reduced vertical profile, and rounded covers allows operators to work directly on the conveyor.

### **MULTI PACKER**

See INDEXER.

### **PRODUCT STOP**

This device is used to temporarily stop the product for placement on another device or as an escapement. They are almost always mounted below the roller surface. Available with a stainless steel blade or pins mounted on a linear thruster that is raised and lowered pneumatically.

### **POSITIONER**

These pneumatic devices are used to precisely locate product. They are available in increasing degrees of accuracy and can be conveyor or floor mounted. Examples of positioners can be as simple as guide rail, or as complex as a clamp and shot-pin arrangement. In many cases, a clamp to a fixed reference is sufficient for the location.

## GLOSSARY OF TERMS

---

### **PRODUCT BRAKE**

Brakes are used to slow down moving products by stalling the roller surface in a specific location. The end result is a gap between products or train of products. Brakes will not always stop products, especially in a train, but can aid in generating gaps for timing devices.

### **PRODUCT PUSHER**

Usually powered by a rodless pneumatic cylinder, the pusher is designed to move products laterally from one conveyor lane to another or even off of the conveyor via a Side Transfer.

### **PULLEY**

Pulleys are used to couple the Drive Belt from the Line Shaft to the Roller Shaft. Pulleys are plastic and pressed on to the roller shaft. No pulleys are used on the line shaft.

Does not apply to Chain Drive conveyors.

### **PULLEY COVER**

See Bushing Cover.

### **REVERSING CONVEYOR**

Reversing conveyor can convey product in either direction, but not both at the same time (See BI-DIRECTIONAL CONVEYOR).

### **ROLLERS**

Rollers are the plastic wheels that actually carry the product on the conveyor surface. They are available in a variety of different materials and in three diameters. We also offer solid or cored rollers for different applications.

Coarse pitch:	32mm (1.260") dia.
Standard Pitch:	21mm (0.835") dia.
Fine Pitch:	17mm (0.670") dia.

### **ROLLER SHAFT**

Roller shafts are made of 8mm diameter stainless steel shafting. Bushings and bushing holders support the shafts on each side of the conveyor. Rollers slip or are pressed onto the roller shaft to make up the roller surface.

## GLOSSARY OF TERMS

---

### **ROLLER SHAFT BEARINGS**

The Bushing is replaced with a sealed ball bearing on one or both sides of the roller shaft. Roller shaft bearings may be used in high-speed applications, heavy product applications or in hostile environments.

### **ROTATOR**

A conveyor section with the ability to rotate. Two types are available. The pneumatic driven rotation which can rotate 90°, +/- 90°, or 180°. Servo driven rotation has unlimited angular capabilities.

### **SENSOR**

Sensors are used to determine where the product is on the system. 12mm barrel type sensors can be installed in the surface in many applications improving or eliminating overhead clutter. Sensors may be optical, inductive, capacitive, or magnetic (hall & reed type). Sensors are optional and can be provided and mounted by Shuttleworth as a value added service for customers who wish to provide their own automation and control.

### **SET COLLAR**

Set collars are used in various applications on Shuttleworth conveyors. The two main applications are to identify set points on adjustable guide rail, and to retain rollers when spring loading.

### **SIDE RAILS**

Side rails are the side members of the conveyor frame. They are available in stainless steel or extruded aluminum. See "FRAMES" for a discussion of types.

### **SIDE TRANSFER**

This is a special arrangement of rollers and bushing covers to allow product to be transferred onto or off of the side of the Slip-Torque<sup>®</sup> conveyor. The bushing cover is removed in the side transfer area and other components will be added to meet the customer's requirement. Side transfers are done on the idle (non-driven) side of the conveyor and may use guides or pushers to move products off of the system. Other devices may be required to aid product transfers on to the conveyor.

### **SKEWED ROLLER SHAFTS**

By moving one end of the roller shaft along the conveyor by one pitch, the product can be made to skew over to one side of the conveyor. Infrequently used, these shafts help a product to travel along a guide rail or move over towards a guide rail from the center of the conveyor. This technique requires a Belt Drive type system.



## GLOSSARY OF TERMS

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### **SLIP-TORQUE PRINCIPLE**

The Slip-Torque<sup>®</sup> principle refers to the friction between the roller and the roller shaft. As the roller shaft turns, the friction between the roller shaft and the I.D. of the roller provides forward "push" to the product being transported. If the product is stopped, the roller shaft continues to turn but not the roller. The outside surface of the roller does not slip against the product because the friction force between the product and the roller is typically higher than the friction force between the shaft and the roller. Forward push or "line pressure" is determined by the coefficient of friction between the roller material and the roller shaft.

### **SLIP-TRAK**

Slip-Trak has all the characteristics of the Slip-Torque<sup>®</sup> but is designed to be compatible with Federal Standard 209E Class 10 and Class 1 (ISO Class 4 and ISO Class 3) clean rooms. The through shaft or open center construction maximizes process adaptability.

### **SPACER ROLLER**

Spacer rollers are simply narrow rollers. They are typically 1/3 as wide as their full-sized counterparts. They are available for all roller diameters. Spacer rollers are needed in applications where the product may need the surface rollers close together.

### **SPACER SLEEVES**

Spacer sleeves are lengths of conductive plastic tubing that are slipped onto the roller shaft to separate rollers. They are used to create gaps in the roller surface for product stops, special sensors, and to fill in large areas of roller shaft where rollers may not be required, as in a frame width transition application.

### **SPEED CHANGE**

A unique characteristic of Slip-Torque<sup>®</sup>, speed changes can be achieved at nearly any point on a conveyor surface. These are useful in creating gaps in a line of products on the conveyor surface, or in closing gaps for accumulation. The system must be engineered with the proper drive components, but then the speed change can happen at any point in the speed change region.

### **SPLIT ROLLER SURFACE**

A split roller surface places a special bushing holder in the conveyor surface, essentially providing two separate surfaces, yet in the confines of one frame assembly. There are a myriad of reasons to split a surface including needing bi-directional conveyance with a small product footprint.

## GLOSSARY OF TERMS

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### **SPRING LOADING**

Spring loading refers to a method of incorporating springs between a pair of rollers on a roller shaft. This creates extra friction in the roller surface, and increases line pressure. This provides for a more positive product control during acceleration or deceleration.

### **STANDARD PITCH**

Refers to a roller center spacing of 22.7mm (.895") or (44 shafts per meter). Also, implies standard pitch rollers 21mm (.835" dia.), but fine pitch rollers 17mm (.670" dia.) can be used.

### **SWINGER (DIVERTER)**

A stand alone pattern forming subsystem that divides one lane of product into multiple lanes. A simple 2 position system might be pneumatic powered, while higher lane counts are servo powered. The Swinger Pattern Former can also be engineered with two parallel infeed lanes.

### **T-BAR**

The T-Bar is used to support and stabilize the center of the roller shafts in conveyor sizes over 310. The T-Bar has load-carrying capacity and prevents bending of the roller shafts under heavy loading.

### **TURNS**

- A. 45° Turn: A special end configuration of Slip Torque® conveyors that can be engineered into most frame sizes and styles. Guides are added to maintain product orientation (non-round product) through the turn.
- B. 90° Turn: A special conveyor module in a limited number of sizes. Power transmission is usually taken from neighboring modules, but the module can be self powered. Product orientation can be maintained with guides through the corner. Uses the Slip Torque® technology to maintain low line pressure and gentle handling
- C. Tapered Roller Turn: Another 90 degree turn, but with tapered rollers across the width of the conveyor. The tapered rollers maintain the product orientation throughout the turn. Designed for heavy duty industrial applications, the tapered roller turn would not be suitable handling small or delicate products.

### **30° TWIST CONVEYOR**

A pair of conveyors which are twisted to allow the products to tilt. Gravity forces the products into the V of the two powered conveyors. This type of conveyor is more effective than guide rail for alignment of heavy stacks of paper or books.

## GLOSSARY OF TERMS

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### **VERTICAL CONVEYOR**

A stand-alone module that transports product vertically between two different elevations. Available with pneumatic or electric drives in non-cleanroom and cleanroom versions.

### **ZONE CONTROL CONVEYOR**

A non-contact queuing and accumulation conveyor that is ultra-clean and compatible with Federal Standard 209E Class 1 (ISO Class 3) clean rooms.