

BELT CONVEYOR FOR USE WITH SEMICONDUCTOR CONTAINERS

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Claim of Priority

This application claims priority under 35 U.S.C. §119(e) to U.S. Provisional Patent Application No. 60/698,124, entitled "Belt Conveyor for use with Semiconductor Conveyors," which was filed with the U.S. Patent & Trademark Office on July 11, 2005, and which is incorporated in its entirety by reference herein.

Field of the Invention:

The present invention generally comprises a conveyor system. More specifically, the present invention comprises a belt conveyor system for moving semiconductor containers through a fabrication facility.

Background of the Invention

There are several ways that semiconductor wafer containers are transported in a semiconductor fabrication facility ("fab"). A system for transporting a container is often referred to as an Automated Material Transport System ("AMHS") or simply as a material transport system. A material transport system may refer to a part or all of the overall system. A fab may use only one type of AMHS throughout the fab, or there may be different types of AMHS in certain areas, or different types of AMHS for different transportation functions. Some of these AMHS types use vehicles to hold the container as it is being transported, such as a rail guided vehicle (RGV) or an automated guided vehicle (AGV). Material transport systems utilizing RGVs or AGVs require managing empty vehicles to arrange their arrival at sites where containers are to be picked up. Waiting for the arrival of such vehicles causes AMHS delays and the management of the vehicle movement increases the complexity of the AMHS. The same issues exist when moving containers with an Overhead Hoist Transport (OHT) system.

Conveyor systems are more efficient at moving containers within a fab without any, or a minimum number of, vehicle delays, and do not have to manage empty vehicles. Conveyors directly move the containers without any material or mechanical interface that comes between the conveyor surfaces and the container surfaces. Unless the conveyor is full, it is capable of immediately receiving a container for transport. For these, and other, reasons, conveyors may provide a very high throughput AMHS.

One example of a conveyor system is disclosed in U.S. Patent No. 6,223,886, entitled "Integrated Roller Transport Pod and Asynchronous Conveyor," which is owned by Asyst Technologies, Inc., and is incorporated in its entirety herein. The drive rail 12 includes a drive system, generally designated at 38 in Fig. 1, for propelling a container 2 along the rails 12. The drive system 38 includes a plurality of separate drive assemblies 40. Each drive assembly 40 includes a plurality of drive wheels 42 which frictionally engage the underside of the container 2 to propel the container 2 along the drive rail 12 for a specific zone Z. As shown in Fig. 1, the drive assemblies 40 are located along the rail such that the separation between the outermost drive wheels 42 of adjacent drive assemblies 40 is substantially equal to the spacing between the drive wheels 42 of the individual drive assembly 40. The drive wheels 42 project upwardly from the drive rail housing such that it is the drive wheels 42 of the rail 12 which directly support the transport container 2. The wheels 42 are preferably mounted at approximately the same height to minimize tipping or rocking of the container 2 as it is moved along the rails 12. It is also known within the art to individually mount a passive wheel 43 between each drive wheel 42 (as shown in Fig. 1).

It would be advantageous to provide a conveyor system that improves the performance of a conventional conveyor and reduces the costs of AMHS conveyor systems.. The present invention provides such a conveyor.

Brief Description of Drawings

FIGURE 1 provides a side elevation view of a conveyor, according to the prior art;

FIGURES 2A-2B provide perspective views of an embodiment of a material handling system according to the present invention, and an enlarged perspective view of a section of the material handling system;

FIGURE 3 provides an end view of the FIG. 2B embodiment of the material handling system with a workpiece container seated on the material handling system;

FIGURE 4 provides a cross-sectional view of one embodiment of a drive system for the material handling system;

5 FIGURE 5 provides a perspective view of another embodiment of a material handling system with a workpiece container seated on the material handling system;

FIGURE 7A provides a perspective view of an embodiment of a container sensor for use with the material handling system; FIGURE 7B provides a plan view of the container sensor shown in FIG. 7A;

10 FIGURE 8 provides a cross-sectional view of an embodiment of a dual beam sensor for sensing the bottom surface of a workpiece container traveling on the material handling system;

FIGURE 9 provides a cross-sectional view of an embodiment of a belt, according to the present invention;

15 FIGURE 10 provides a side elevation view of an embodiment of a drive system, according to the present invention; and

FIGURE 11 provides a perspective view of an embodiment of a conveyor system in conjunction with a load port.

Detailed Description of the Invention

20 Fig. 2A illustrates a conveyor system **100**. The conveyor system **100** is shown, for exemplary purposes only, with only one zone, zone **Z**, having a drive system **130** installed. The conveyor **100** includes, among other things, a beam **102**, a beam **104** spaced apart from the beam **102**, and multiple cross-tie plates **106** securing the two beams **102** and **104** together at several locations. A cross-tie plate **106** is secured to the beams **102** and **104** at
25 each of the ends **190** and **192** of the conveyor **100**, and an additional cross-tie plate **106** is secured to the two beams **102** and **104** in the middle of the conveyor **100**. A cross-tie plate **106** may be secured to the beams **102** and **104** at other locations.

The beams **102** and **104** form the two sides of the conveyor assembly **100** and, in a preferred embodiment, are made from folded sheet metal. The sheet metal structure of the
30 beams **102** and **104** is an improvement over other conventional conveyor structures. Other

types of structures (e.g., machined extrusion, machined bar stock, machined plate) may have several drawbacks. For example, other structures may twist during the machining or extruding process. Extrusion inherently produces material that will twist as it is forced through the die, and it then has to be corrected as much as possible. Machining processes
5 relieve area stresses in the metal causing stress imbalances that warp the material. These fabrication problems can cause the final conveyor assembly to bow or twist in a way that causes alignment problems. In addition, other structures may be expensive because of the machining time required. And other structures may be heavy because it is not convenient or cost effective to remove all of the material (with a machining process) that is not
10 needed for rigidity.

Fig. 2B illustrates that each cross-tie plate **106** is attached to two walls of each beam **102** and **104** - the beam's bottom wall **109** and the beam's side wall **107**. By attaching each cross-tie plate **106** to two separate walls of each beam, the cross tie plate **106** provides torsional strength and a precision reference structure for the beams **102** and
15 **104**. Fig. 2B illustrates that the cross-tie plate **106** is flush with the end of the beams **102** and **104**. The cross-tie plate **106** may also extend outward slightly from the end of the sheet metal beams **102** and **104**. In this case, a second conveyor section may attach to the cross-tie plate **106** and form an aligned, adjacent conveyor to the conveyor **100**.

The folded sheet metal structure has several advantages. The substantially "C"-
20 shaped cross section (see Figs. 3-4) beams **102** and **104** have a side wall **107** with a height **H** and a bottom wall **109** with a width **W**. A side wall **107** that is longer than the bottom wall **109** provides high rigidity for vertically deflecting loads. In addition, the uniform cross section of the beams **102** and **104** provides the best weight to strength ratio. Each bend in the sheet metal beams **102** and **104** is along the longitudinal axis of the beams (e.g.,
25 along the length of the conveyor system **100**). These bends in the sheet metal naturally form a straight line and eliminate bowing and twisting. The straightness of each beam **102** and **104** is assured using a simple and inexpensive process.

Fig. 2B provides a more detailed view of the zone **Z** of the conveyor **100**. In this embodiment, the drive assembly **130** includes a pair of drive wheels **114**, a cartridge **129**
30 of passive wheels **116**, a belt tensioning idler **118** and a drive motor **124**. The belt tensioning idler **118** may be adjusted until adequate belt tension is achieved.

Fig. 2B illustrates that the belt 112 travels around each drive wheel 114, the passive wheels 116 and the belt tensioning idler 118. The spacing between each passive wheel 116, and the spacing between each drive wheel 114 and an adjacent passive wheel 116 may vary. The diameter of the passive wheels 116 is smaller than the diameter of the drive wheels 114. The passive wheels 116 are pre-mounted to the cartridge 129. The cartridge 129 is mounted to the beam such that the center 117 of each passive wheel 116 is located at a higher elevation on the beam than the center 115 of a drive wheel 114 (see Fig. 10). Thus, the belt 112 is substantially horizontal as it travels across the drive wheels 114 and passive wheels 116.

In a preferred embodiment, the passive wheels 116 are rotatably mounted to the cartridge 129, which is mounted to the beam 104. Each passive wheel 116 may also be individually mounted to the beam 104. The cartridge 129, however, eliminates the need to individually mount each passive wheel 116 to the beam 104. The cartridge 129 also eliminates shafts passing between the beams 102 and 104 for connecting passive wheels 116. As shown in Fig. 2B, the cartridge 129 includes eight passive wheels 116. It is within the scope of the present invention for the cartridge 129 to include any number of passive wheels 116.

The passive wheels 116 provides several advantages over a conventional conveyor system. One advantage is that the passive wheels 116 improve the smoothness of FOUP travel along the conveyor system 100 because the passive wheels minimize the gap between wheels that the FOUP's bottom plate must travel over. The passive wheels 116 make the drive assembly 130 a simpler mechanism than requiring every wheel to be a drive wheel. Often, drive assemblies used in a conventional conveyor comprises individually driven wheels for both contacting and driving the container along the conveyor.

The larger the spacing between passive wheels 116, the rougher the container movement along the conveyor 100. The variations in the FOUP's bottom surface often have greater excursions from the plane formed by the top surface of the passive and drive wheels as the gap between wheels increases. In Fig. 1, when the FOUP's front edge contacts the next drive wheel 42, there is a shock as these surface non-planarities abruptly hit the wheel 42. More passive wheels 43 between the drive wheels 42 as an improvement. But each time a FOUP passes between passive wheels 43, the FOUP's front edge contacts

the stationary passive wheel **43** and there is an undesirable scrubbing as the FOUP strikes the wheel and accelerates the rotation of the passive wheel **43**. If the drive belt links the drive wheel hubs together, the belt must travel over each wheel hub to assure proper traction. This belt wrap requirement complicates the drive system by adding additional idlers, and the more drive wheels the more complexity.

The drive assembly within a conveyor zone, as shown in Fig. 1, requires 35 bearings for each drive assembly. Thus, each zone requires 70 bearings. When a large quantity of conveyor in a fab installation is considered, (thousands of meters of conveyor), the reduction in bearing count while providing superior two sided drive, would be a major improvement. The conveyor **100** reduces the number of bearings and shafts required by a drive assembly **130**. Fig. 3 illustrates that a bearing **180** is positioned at each drive wheel drive shaft support **120** and a bearing (not shown) is required at each of the passive wheels **116** (because they are not under any tension load). The idler **118**, in one embodiment, also only requires one bearing. Thus, only 22 bearings are required per zone for the two drive assemblies **130**.

Each zone **Z** of the conveyor **100** includes two drive assemblies **130**. Each drive assembly **130** provides a simple travel path for the belts **110** and **112** and maintains an appropriate tension within the belts **110** and **112**. Each drive assembly **130** also supports and maintains a portion of the belts **110** and **112** raised above beams **102** and **104** for supporting the container **2**. The drive assemblies **130** compose a plurality of operational zones **Z**, with each zone **Z** including one drive system **138**. However, in other embodiments of the invention the zones **Z** may each include more than one drive assembly **130**. The drive speed and direction (forward or reverse) of each zone is independently controlled.

Fig. 2B also illustrates that each zone **Z** preferably includes at least two sensors **122** for detecting the presence of a container **2** within the zone. In the present invention, the sensors **122** are located near the entrance and exit of the zone **Z** to detect when the container enters and leaves the zone. The location of the container **2** is used to activate the zones located downstream so that the belts of the downstream zone are active and operating at the same speed as the belts **110** and **112** in the previous zone when the pod reaches the downstream zone. The sensors may also deactivate drive assemblies of the zone the container **2** just left. The time the container **2** takes to travel between the sensors

122 may also be used to monitor the actual speed of the container as the container travels through the zone. The sensors 122 are preferably not spaced so far apart that a container may sit within a zone and not be detected. For example, if the container 2 is traveling on the conveyor 100 as shown in Figs. 5-6, the sensors 122 are preferably not spaced apart further than the width of the container 2. If, however, the container 2 is traveling on the conveyor 2 face forward or backward (e.g., rotated 90 degrees from that shown in Figs. 5-6), the sensors are preferably not spaced apart further than the depth of the container 2.

Each zone Z preferably includes one microprocessor or control device (not shown) for controlling operation of the drive assembly 130 in that zone. The control device may be coupled to a control system that controls overall operation of the conveyor. The configuration of the control system is subject to considerable variation within the scope of this invention. For example, the control system may include a computer for controlling operation of the entire conveyor 100, controlling each zone Z. The computer may also monitor the status of the load ports 10 (see Fig. 11) and, when the load ports are filled, stop the approaching transport pods 2 at spaced apart locations upstream from the filled load port to prevent collisions between the pods. The computers of each bay may be standalone systems or the computers may be part of a network that includes the control systems for the inter-bay conveyor, the stockers, and other automated components of the manufacturing facility. The central control system of the processing facility may also monitor the processing machines. One example of such a control system is disclosed in U.S. Patent No. 6,853,876, entitled "Distributed Control System Architecture and Method for a Material Handling System," which is owned by Asyst Technologies, Inc., and is incorporated in its entirety herein.

Fig. 3 illustrates that the belts 110 and 112 support the container 2. In one embodiment, each zone Z of the conveyor 100 includes a drive assembly 138 (see Fig. 10) for driving the belts 110 and 112 and propelling the container 2 along the conveyor 100. Fig. 3 illustrates that a cover 140 mounts to the beams 102 and 104 to protect the drive assemblies 130. The cover 140 also helps retain any particles generated by the drive assembly 130. The covers 140 are optional.

In one embodiment, the conveyor 100 is raised off the fabrication floor by a support 150. The Fig. 3 embodiment illustrates the support 150 mounted to a track 156. In one embodiment, the support 150 may slide along the track 156 for positioning the

conveyor **100** within the facility. The track **156** includes a locking clip **154** so that the support **150** may be locked in place with respect to the track **156**. Fig. 3 illustrates that the support **150** is held in place by a locking clip screw **152**. The support **150** may be locked to the track **156** by other devices known within the art. The support **150** also includes a
5 receptacle **123** that interlocks with the cross-tie key **108**; locking the conveyor **100** on the support **150**. The conveyor **100** may also be hung from the fabrication facility ceiling, mounted to a facility wall or mounted to any object that will support the conveyor's weight.

In one embodiment, the cross-tie plate **106** includes a cross tie key **108** that fits
10 into a notch **123** in the support **150**; allowing for a consistent relationship between the base of the support **150** and the top surface of the conveyor (e.g., the elevation of the belts **110** and **112**). The bottom of the support **150** may slide along the track **156**, and may be locked into the beveled surfaces of the track **156**. In one embodiment, one of the locking surfaces is machined into the conveyor support plate **150** and the locking clip forms the
15 other locking surface. Other locking mechanisms are within the scope of the invention. When a conveyor section is replaced, the locking clip screw is loosened, and the conveyor section, with its support plates, is removed. A new conveyor section is then installed by placing its support plates **150** on the track **156** and then the locking clip screws are tightened. The precision cross-tie plate **106**, cross-tie key **108**, support plate notch **123**
20 and support plate locks combine to provide a precise method of conveyor alignment that allows for quick conveyor replacement. This system takes advantage of the precise and predictable floor structure of a typical semiconductor fab.

Multiple conveyors may be mounted to the track **156**. The support **150** of each conveyor **100** slidably mounts to the track **156**. Once the support **150** is placed on the
25 track **156** the conveyor **100** may be slid along the track **156** to its desired position. For example, a conveyor **100** may be moved along the track **156** until its first end **192** is adjacent to the second end **192** of a previously mounted conveyor **100**. Mounting multiple conveyors **100** to the same track **156** aligns the ends of the each conveyor **100**.

Figure 4 illustrates a cross-sectional view of a drive wheel **114** and the surrounding
30 components. The drive shaft **120** is supported in the beam **104** by a bearing **180**. The drive wheel **114** is mounted to the end of the drive shaft **120**. The cover **140** is mounted to the beam **104** and protects the drive wheel **114**. The transport belt **112**, in this

embodiment, includes a lip 113. The lips 113 help maintain the container 2 on the belt 112. The top 141 of the cover 140 also provides an additional lateral restraint on the container. For example, the top 141 of the cover 140 will prevent the container 2 from rotating on the belt 112.

5 The transport belts 110 and 112 also links drive wheels 114. In a preferred embodiment, the drive wheels 114 (with a smaller amount on the idler) substantially support the transport belt tension force with little or no tension force on the passive wheels 116. The belts 110 and 112 each support the FOP's bottom plate 8. If the belts 110 and 112 have enough tension to support a FOUP (approximately 20lbs), then the belts 110 and 112 support most of the FOUP's weight and the transition between passive wheels 116 is smother, reducing vibration.

 Maintaining belt tension reduces the amount of vibration a container is subjected to compared to the abrupt shock caused by a conventional wheel supported AMHS conveyor. Vibration in the containers is very undesirable because of the sensitive and ultra-clean nature of the environment required for the semiconductor wafers inside of the container. To ensure accurate tracking and stable guidance of the FOUP, the conveyor structure may be intentionally tilted to one side of the conveyor (approximately 1/2 to 5 degrees), which induces a gravitational bias, assuring that the FOUP tracks against the guiding features of the lower conveyor side.

20 Figs. 5-6 illustrate a container 2 moving on the conveyor 100 in a sideways position. The belts 110 and 112 are spaced apart to support the FOUP's bottom plate 8. It is also within the scope of the present invention for the FOUP 2 to travel along the conveyor 100 in other orientations. For example, the FOUP 2 may travel along the conveyor 100 with the FOUP door 4 facing forward (in the direction of travel) or backwards (opposite of the direction of travel). The width of a conventional 300mm FOUP is not the same as the depth of the FOUP. Thus, the spacing between the belts 110 and 112 must be adjusted according to the orientation of the FOUP on the conveyor.

 The bottom surface of a FOUP, in the sensing area, is not standardized between manufacturers. There are parts of the FOUP's bottom surface that has small voids, deep pockets, or sharply angled reflective surfaces. A sensor with a single emitter and detector may have difficulty sensing any one of these singularities.

Figs. 7A-7B illustrate a dual element sensor **122**. The sensor **122** includes a sensor housing **202** mounted to a printed circuit board **204**. A mounting bracket **220** affixes the sensor **122** to a beam. The housing **202** includes four apertures **206**, **208**, **212** and **216**. Fig. 8 illustrates a cross section of the sensor **122** for sensing the bottom surface of a container on the conveyor. A container **2**, oriented as shown in Fig. 4, has a sensing width of 390 mm. This requires two sensors **122** for each 500mm section of conveyor **100** to assure that the sensor **122** senses the container **2** in any position within the conveyor zone. In one embodiment, the sensor **122** is integrated with existing control circuit boards located in the beams **102** and **104**. The sensor apertures **206**, **208**, **212** and **216** face upwards in order to sense the bottom of the container **2**.

An array of emitter/detector pairs could have at least one pair sensing an area that has reasonable sensing characteristics even if the other pair is operating in an undetectable region. Figure 8 illustrates two sensor pairs - **E1/D1** and **E2/D2** - within the housing **202**. More sensor pairs may be used if necessary. The housing **202** includes an aperture **206** over emitter **E1** to reduce the emitter's projected beam. Thus, the emitter **E1** emits light within the angle $\theta 1$. The housing **202** includes an aperture **208** over emitter **E2** to reduce the emitter's projected beam. Thus, the emitter **E2** emits light within the angle $\theta 2$. The housing **202** includes an aperture **212** over the detector **D2** to allow a full acceptance of incoming light (see angle $\theta 3$). The housing **202** includes an aperture **216** over detector **D2** that allows a full acceptance of incoming light (see angle $\theta 4$). In one embodiment, the overall sensing width is approximately 12mm. The sensing width may vary.

The partially blocked beams emitted by the emitters **E1** and **E2** creates a distinct illumination edge **218** at either side of the sensor **122**. The controlled illumination creates an accurate position at which the leading edge of the FOUP is sensed regardless of the direction of FOUP motion. No light is reflected off of the FOUP's bottom surface until the FOUP front edge crosses the point directly above the center of the emitter, where the emitters have their distinct illumination edge **218**. The point at which the FOUP front edge first crosses the emitter's illumination point is within the viewing aperture of its paired detector. If the FOUP were vertically too close to the sensor housing, this illumination point would not be in the apertured view of the detector.

This sensing method provides repeatable sensing that allows for accurate positioning of the FOUP **2** on the conveyor **100**. The two pairs of sensors **122** are spread

out so that if one pair is positioned at a feature that is difficult to sense the other pair will provide adequate sensing. The FOUN bottom surface may be analyzed for optimum sensor spacing. In a preferred embodiment, both detectors **D1** and **D2** are logically gated with an "OR" function – either by their immediate sensing circuits or by a microprocessor, microcontroller or digital signal processor that is receiving the signal individually. Either detector receiving an adequate signal will be interpreted as a FOUN sense event for the combined sensor.

Fig. 9 illustrates the belt **112**. In this embodiment, the belt **112** comprises a support surface **111** and a guide or lip **113**. The FOUN's bottom plate **8** rests on the support surface **111** as the belt **112** propels the FOUN down the conveyor **100**. The support surface **111** is shown as a planar surface. However, it may be desirable for the support surface **111** to comprise a pebbled or ribbed surface.

The belt **112** comprises two layers of material. In a preferred embodiment, the first layer **172** comprises Shore 80A polyurethane and the second layer **174** comprises Shore 70A polyurethane. The first layer **172** includes S&Z wound Kevlar strands **176** to increase the rigidity of the first layer **172**. The two different materials creates a belt **112** having rigid first layer **172** and a softer second layer **174**. The softer second layer **174** acts as a built-in suspension system that helps the FOUN ride down the conveyor smoother than if the support surface **111** comprised a more rigid material. The belt **112** also preferably includes an electrostatic discharge additive. The belt **112** may comprise other materials.

Fig. 10 illustrates one embodiment of a drive system **138**. The drive system **138** includes, among other things, a drive motor **124** coupled to a drive wheel **114**. The output shaft of the drive motor **124** is coupled to a wheel **139**. The wheel **139** is coupled to the drive wheel **114** by a timing belt **151**. In this embodiment, the timing belt **151** has teeth **153** to form a rack and pinion arrangement with both the wheel **139** and the drive wheel **114**. Other mechanisms known within the art may be used to rotate the drive wheel **114**. The drive system **138** rotates the belts **110** and **112** within each section or zone of the conveyor **100**. The drive motor **124** may rotate in clockwise and counterclockwise directions of rotation, allowing the belts **110** and **112** to move a transport container **2** forward or backward along the conveyor **100**.

The drive systems **138** of adjacent operational zones are preferably accelerated and decelerated at the same rate such that at the time of transfer, the speed imposed on the transport container **8** by the adjacent drive assemblies **130** is synchronized at the time of transfer between the zones. When a container **2** is being propelled along the conveyor **100**, it is possible that only the operational zones includes the zone directly below a container **2** and one or more zones adjacent the container **2** are active at any time. By only activating specific zones in anticipation of a container entering the zone, the power consumption of the conveyor system is reduced and extends the operational life of the drive assemblies **130**. Containers moving on the conveyor **100** are preferably separated by at least one empty zone, in which there is no container **2**, to provide a buffer between containers **2** and protecting the containers against inadvertently bumping into one another. The spacing between the containers is preferably increased as the velocity of the container increases to provide a safe stopping distance at all times. When containers are not in motion, the containers may occupy adjacent drive zones on the conveyor.

The drive system **138** of the illustrated embodiment provides a clean, efficient drive mechanism for moving the container **2** along the conveyor **100** in a precise controlled manner. However, it is to be understood that other types of drive systems may be used in other embodiments of the invention. Using the independent drive assemblies **130** of this invention, the movement of several containers may be independently controlled. It is within the scope of the invention to operate multiple drive assemblies **130** with a single drive motor **124**. Each drive assembly **130** may, for example, include a clutch mechanism that could couple each drive assembly **130** to the drive motor **124**. Fig. 10 also illustrates a spring tension mechanism **195**.

Fig. 11 illustrates the conveyor **100** in conjunction with a pair of load ports **10**. Each load port **10** includes a plate **12** with an aperture **14**, a port door **16** and vertically adjustable FOUP advance plate **18**. One such load port **10** is disclosed in U.S. Application No. 11/064,880, which is assigned to Asyst Technologies, Inc. and is incorporated in its entirety herein. The conveyor **100** moves a FOUP **2** adjacent the load port **10**.

The conveyor section **300** located in front of each load port **10** accommodates the container advance plate **18**. Each conveyor section **300** includes a belt **302** for supporting the back end of the FOUP **2** and two belts **304** and **306** for supporting the front end of the FOUP **2**. The beam supporting the two belts **304** and **306** are split to accommodate the

arm **20** that moves the FOUP advance plate **18** up and down. Each section of beam may include a drive assembly similar to the drive assembly **130** in each zone **Z** of the conveyor **100**.

5 The conveyor **100** and conveyor sections **300** are shown mounted to a rail or track **400**. The track **400** provides a common mounting structure for the conveyor sections **300** and the conveyor **100**. The track **400** aligns the z-axis and y-axis of the conveyor sections **300** with the conveyor **100**, yet allows the conveyors to move along the x-axis. The rail **400**, in this embodiment, is mounted to vibration mounts **404**.

10 It should be appreciated that the above described mechanisms and methods for supporting and transferring containers and/or conveyor belts are for explanatory purposes only and that the invention is not limited thereby. It should be apparent to those skilled in the art that certain advantages of the within system have been achieved. It should also be appreciated that various modifications, adaptations and alternative embodiments thereof may be made within the scope and spirit of the present invention.

Claims:

1. A conveyor for moving a semiconductor container having a bottom plate, said conveyor comprising a plurality of conveyor zones, each conveyor zone comprising:
 - a first belt;
 - 5 a second belt;
 - a drive assembly for rotating said first belt and said second belt at substantially the same speed; and
 - said first belt and said second belt movably supporting the container bottom plate as the container moves within the conveyor zone.
- 10 2. The conveyor zone as recited in claim 1, wherein said drive assembly comprises:
 - a first drive shaft having a first drive wheel mounted at a first end of said first drive shaft and second drive wheel mounted at a second end of said first drive shaft;
 - a second drive shaft having a third drive wheel mounted at a first end of said
15 second drive shaft and fourth drive wheel mounted at a second end of said second drive shaft;
 - a plurality of passive wheels located between said first drive wheel and said third drive wheel;
 - a plurality of passive wheels located between said second drive wheel and said
20 fourth drive wheel;
 - a drive motor for rotating said first drive shaft;
3. The conveyor zone as recited in claim 2, wherein said first belt travels around said first drive wheel, said third drive wheel and said plurality of passive wheels located between said first drive wheel and said third drive wheel.
- 25 4. The conveyor zone as recited in claim 2, wherein said second belt travels around said second drive wheel, said fourth drive wheel and said plurality of passive wheels located between said second drive wheel and said fourth drive wheel.
5. The conveyor zone as recited in claim 1, further including at least one sensor for detecting the position of the container within the conveyor zone.