FlexCAM CONVEYORS AUTOMATION MACHINERY

TWENTEBELT

METAL CONVEYOR BELTS

TWENTESIDEFLEX™

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OUTSIDE DIRECT DRIVE TWENTEFLEX™

TwenteSideFlex is based on our TwenteFlex spiral belt and designed to be used in spiral or oval systems without a center drum that drives the belt. It's drive sprockets are fitted on one or more vertical drive shafts at the outside edge of the belt, engaging in the outer link of the belt.

DRIVE PRINCIPLE

TwenteSideFlex is an addition to our low tension driven TwenteFlex conveyor belt which was introduced in 2009. While low tension drive is the most common and well known drive solution in spiral belt technology, outside direct drive offers features which can be more beneficial when dealing with certain conditions or concerning specific applications.

ADVANTAGES

TwenteSideFlex has a different approach that may just suit your application, system or workspace better then low tension drive does. Because there is no drum in the center when using outside direct drive, you are free to exploit that space in any way you like. And due to it's design, a system running TwenteSideFlex is much easier to clean, allows for wide belts and allows for a single belt to run up and down in the same spiral. (P-loop)

- Runs more smooth and more stable compared to friction driven conveyor belts
- Allows for various system layouts
- Allows for the same belt running up and down in the same spiral (P-loop)
- No need for a big and expensive drum
- Suitable for wide belts
- Less product movement (compared to the low tension principle)
- Makes it possible to have multiple belts in one system
- Simple system design

THE PRINCIPLE
THE THEORY OF TWENTESIDEFLEX

The TwenteSideFlex belt is developed after evaluating the various side driven belts already in the market. This resulted in a simple, robust and reliable belt aimed to prevent unscheduled stops.

DESIGN CHARACTERISTICS

- Simple and ridged belt design with minimum number of parts.
- Cleanable design without dead-end cavities.
- No hold down tab eliminates the risk of the belt jamming on the belt support rails and allows for a modular frame design.
- Outside sprocket drives directly on the link in the centre of the force transfer minimising torque in the cross rods.
- The sprocket drives above and below the belt surface thus eliminating torque in the links.
- Form-locked sprocket design prohibits the belt from jumping the teeth.
- Easy adjustable sprockets allow for quick re-alignment of links when shortening the belt.
- Full stainless steel belt edge without plastic parts that can embrittle or catch fire.
- No outside welds that can break.
- The TwenteSideFlex link has an integrated 12.5 mm guard edge.

EXAMPLES OF POSSIBLE SYSTEM LAYOUTS

SPIRAL
(LOW IN - HIGH OUT)

SPIRAL P-LOOP
(LOW IN - LOW OUT)

OVAL
(LOW IN - HIGH OUT)

OVAL P-LOOP
(LOW IN - LOW OUT)

BENEFITS

LESS PRODUCT MOVEMENT

A low tension spiral is operated on a friction slip principle, which generates sudden movements and vibration on the inside belt edge. This belt movement can cause production loss, damage and/or alignment problems at the discharge of the system. But TwenteSideFlex has no drum and no drum means: no inside edge slip or vibration.

MORE AFFORDABLE

Twentebelt is the new provider of outside driven metal conveyor belts. We have reviewed existing solutions and found several ways to be more cost efficient. Reducing expenses and increasing the performance.

LESS DOWNTIME, THANKS TO MORE PREDICTABILITY

Both low tension spirals and outside driven systems need to be properly installed. But once installed, the performance of TwenteSideFlex is better controllable, given the absence of the unpredictable friction coefficient of the drum.

NO RISK OF CHRISTMAS TREEING

'Christmas treeing' is one of the worst things that can happen to a low tension spiral system: the friction on the drum fails, the belt flips up and gets stuck. This leaves you with only one option: get the grinder.

ELIMINATING THE DRUM, LEADS TO MULTIPLE MAJOR BENEFITS

- Reducing costs, as the drum is an expensive part of a low tension spiral.
- Not having a drum to clean, as the drum needs regular cleaning especially when your working environment can get greasy (oil/frying) and disturbs the friction coefficient.
- Maintenance and cleaning of the system are less difficult and time consuming, as there is no drum using up all the space in the centre of your spiral.
- Not having a drum makes alternative airflows possible
- More usable space, due to a smaller footprint. You'll get extra space to exploit in any way you like. (to place the heat exchanger for cooling/deep-freezing for instance)

FINISHED WITH A MECHANICAL BEND INSTEAD OF A WELD

As we all know, welding is a solid and strong way to make a joint. But welding does effect the material properties, as the material is exposed to extremely high temperatures. (especially the area surrounding the weld). Welding causes an embrittled zone next to the weld that can break if exposed to dynamic tensions. (fatigue) Also, welding requires pickling and passivating afterwards. That's why we chose for a mechanical bend instead of a weld.

GENERAL REMARKS

SYSTEM DESIGN

- The minimum tier distance is 120 mm due to the accessibility of the drive sprockets. For belts that run up and down in the same stack the minimum tier pitch is 60 mm. The maximum incline angle of the outside edge of the belt is 1.4 degrees.
- Make sure there is enough free space above or below each sprocket so the bolts can be removed.
- All drives must run perfectly synchronized! It is advised to, if possibly, mechanically connect the drives or use absolute encoders on all drives. In case multiple drives are needed, it is not sufficient to run with equal drive settings on the frequency controllers or even run all drives using only one frequency controller. The drives must stay synchronized at all times, also after emergency stops.
- For the average application, the maximum belt speed is 25 m/min.
- Let the belt follow its desired path as much as possible.
- Minimize the use of guide plates to track the belt.
- If necessary, place a helper drive in the belt return section.
- Make sure that the belt transition from one belt support section to the next is smooth.
- It is recommended to fit a sensor system to detect if the belt did jump the support rail. Alternatively a hold down rail can be used.
- The belt only would jump the support rails if the drive settings are not correct and the belt tension becomes too high (for example too few collapsed links after a sprocket in a freezer). In that case the reason of the belt jumping the support rail should be investigated and solved!

DRIVE

The drive sprockets have to be placed such that the belt tension will not exceed a maximum of 125 kg per sprocket. The belt is guided through curves by means of the outer drive links that latch behind the outer support rail. The inside edge of the belt must run free and not touch the framework. Twentebelt can assist in calculations and preferred drive locations.

LUBRICATION

To reduce belt tension and belt wear, it might be necessary to lubricate the belt. For example, when transporting sticky products or when operating in high temperature, a dry environment or at high speeds. If allowed, it will help to lubricate the outer support rail as well.

To prevent excessive belt tension in freezers, regularly check if there is enough belt between each drive; minimal 0,5 to 2 collapsed links after each drive sprocket. Also check if the plastic rail caps, on the outer support rails, stay in their correct positions.

TAKE UP / SAG

Since the number of links is fixed between each sprocket, there is no need for a big take-up/sag as generally used on low tension spirals. It is recommended to design a small, simple, take-up/sag in the belt return, depending on the length and layout of the belt return and temperature differences.

COLLAPSED BELT AFTER SPROCKET

Directly after every drive sprocket the belt must collapse for at least 0,5 to 2 links. Especially in freezers this is important as the belt will shrink due to temperature. If there would be no excess belt, the belt would stretch causing a dramatic increase in tension resulting in the belt jumping the outside guide rail. Twentebelt can advise on the specific number of collapsed links after a sprocket.

OPERATION

Clean the belt and supports regularly, to avoid high belt tensions due to friction increase. Especially the radial friction between the TwenteSideFlex link and the outer belt support contributes a lot to the belt tension. For example, friction increase could be caused by product contamination.

SPROCKETS

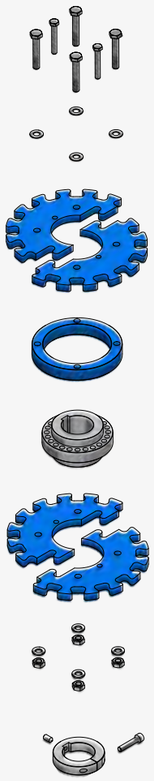
MAIN DRIVE SPROCKETS

The drive sprockets are available in 16 and 18 teeth and can be split both horizontally and vertically, so replacement drive parts can be fitted quickly. Additionally it is possible to adjust the position of the sprocket very easily in small steps. The drive sprocket can be simply adjusted by lifting the two locking pins. This dis-engages the sprocket teeth from the center part so the sprocket can be rotated freely.

In order to be able to remove the bolts when the sprockets are fitted on the drive shaft, the minimum tier distance for an up or down-only spiral is 120 mm. For a spiral that is running up and down in the same stack (with P-loop) the minimum tier distance is 60 mm due to the double tier space.

Twentebelt designed a dual teeth sprocket. The big advantage of this design is that the drive sprocket does not cause any torque in the drive link causing more movement, wear and fatigue in the belt.

If the drive would be single teethed and drive mainly from below the belt surface, the teeth would try to lift up the drive link. Another advantage of the dual design is that the belt is “trapped” in the sprocket ensuring a solid drive. The sprocket does not have a set screw but rests on top of a separate set collar that must be fixed on the drive shaft at the correct height. All sprocket parts are made from food approved materials.



TWENTESIDEFLEX SPROCKET

Main drive sprocket

- Teeth: POM (Acetal), PA6 (Nylon) or stainless steel
- Center part: AISI 303
- Set collar: AISI 303

Helper drive sprockets

- POM (Acetal) or PA6 (Nylon)

Idlers

- POM (Acetal) or PA6 (Nylon)

Other materials on request.

Specifications

The sprocket width is 42 mm for both the 16 and 18 teeth version. Including the set collar and bolts, the total sprocket height is 71 mm.

The outside diameter of the 16 teeth sprocket is 225 mm.

- Standard bore size is round 50 mm with DIN key way.

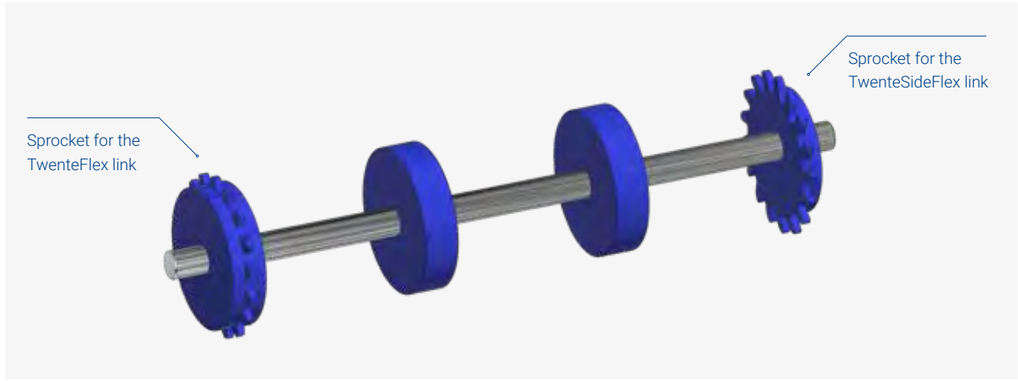
The outside diameter of the 18 teeth sprocket is 252 mm.

- Standard bore size is round 70 mm with DIN key way.

Other bore sizes are available on request.

HELPER AND IDLER ROLLERS

If an extra drive is needed in the belt return part, it is an option to use a special drive shaft. The TwenteSideFlex link needs a special 17 teeth sprocket with longer teeth. For a belt that has a TwenteSideFlex link on the outside edge and a TwenteFlex link on the inside edge, the image below shows a typical helper drive shaft. The PCD is 219,1 mm using support rollers every 250 to 300 mm that have a 205,2 mm outside diameter if the belt is equipped with a stainless steel spiral overlay. If the belt is equipped with a plastic overlay the idler rollers should have an outside diameter of 200,4 mm.

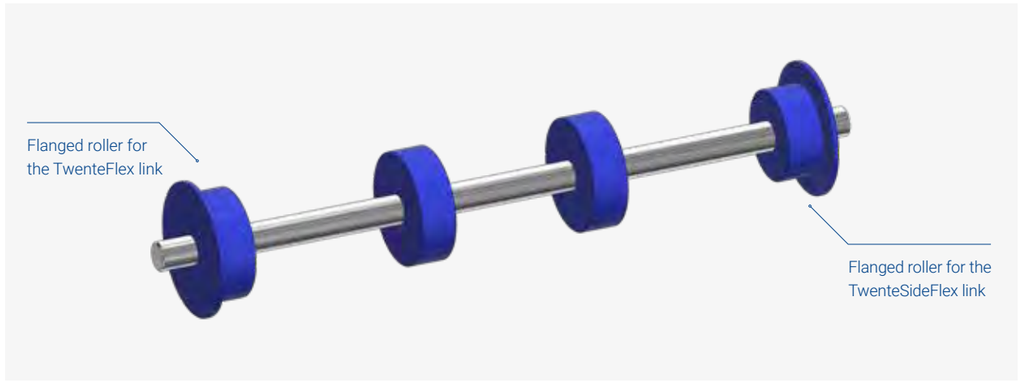


SPECIAL TWENTESIDEFLEX HELPER DRIVE SHAFT

IDLER SHAFT

Idler shafts should be fitted with flanged rollers at both sides. Support rollers should be placed on all shafts every 250 to 300 mm to minimize bending of the cross rods. The links should be supported at any turn, in order to avoid the mesh being fatigued. The image below shows two special flanged rollers, which are needed to support the links.

Idle rollers should be placed in such a way that the belt is lifted from the belt support rail by 1 or 2 mm. If the rollers are placed lower than the support rails the belt is pulled into the support rail, which can result in excessive wear on belt and support rails, increased belt tension, tracking problems, etc.



SPECIAL TWENTESIDEFLEX IDLER SHAFT

ON REQUEST WE HAVE A 6” AND 8” IDLER SET AVAILABLE:

- The 6” idler uses 140,1 mm rollers (plastic overlay 135,3 mm) that fit to a 12 teeth sprocket with PCD 155,6 mm.
- The 8” idler uses 192,2 mm rollers (plastic overlay 187,4 mm) that fit to a 16 teeth sprocket with PCD 206,4 mm.

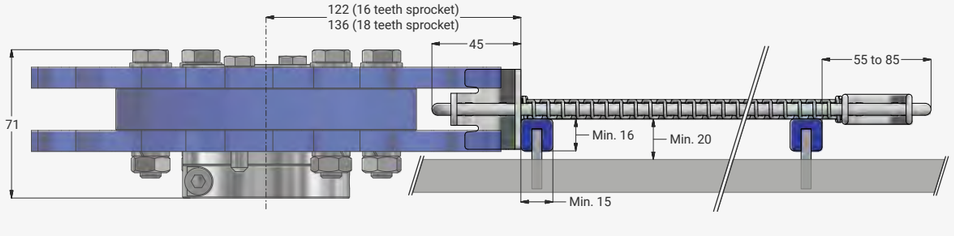
BELT SUPPORT RAILS

The outside belt support rail also functions as belt guidance rail when the belt is making a curve. Therefore, the design of this rail must be accordingly sturdy.

It is advised to use a minimum plastic rail height of 16 mm and a minimum 20 mm free space for the drive link to pass. The advised width of the support rail is minimal 15 mm. Smaller widths could increase movement of the spiral overlay. (see drawing below) The positioning of the outer support rail is 45 mm from the outside belt edge to the point where the link touches the support rail. The distance between the center of the sprocket shaft to the point where the link touches the support rail is 122 mm (16 teeth sprocket) or 136 mm (18 teeth sprocket). (see drawing below)

The advised distance between the support rail and the inside belt edge is 55 - 85 mm. (see drawing below)

The recommended belt support material is low friction PE-1000 (UHMW-PE) for applications up to 60°C. Other materials are possible depending on the application.



THE PROTRUSION OF THE TWENTESIDEFLEX LINK

- 12,5 mm (plastic overlay)
- 15,5 mm (spiral mesh overlay)

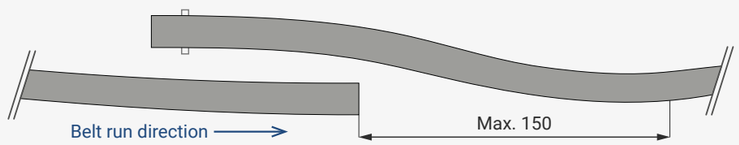
A great advantage, due to the “tap-less” belt design, is that it is possible to use a modular system for the belt support. (see drawing below) This makes it much more economic to build. Try to maximize the distance of the last split (before the sprocket) to the drive sprockets. The minimal split distance is 1 meter before the drive sprockets.

THE ADVISED NUMBER OF SUPPORT RAILS

BELT WIDTH (IN MM)	NUMBER OF SUPPORTS
≤ 610	2
611 - 1016	3
1017 ≥	4

The number of support rails also depends on the belt weight and product load.

Since the outer guide strip is the sole reason that the belt runs in the spiral shape, it must be checked regularly and replaced in time.



SPLICING AND SHORTENING

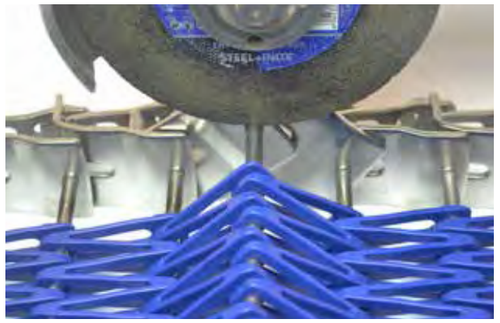
SPLICING / JOINING

When the belt has to be spliced together it is recommended to use a supplied connector rod. This rod is bent at one end and can be secured with a nut or welding ring at the opposite end.

- Insert the rod from the outside of the belt. This creates a continuous outside edge, which is driven by the sprocket
- Make sure the belt still collapses properly, while tightening the nut
- Make sure both links are parallel to each other before welding
- Weld the nut to the rod making sure the rod end is smooth
- Make sure the bent side of the rod is inserted in the middle hole of the outside link as far as possible
- Weld the inside legs of both links to the cross rod
- The inside welds are preferably small welds that do not compromise the rod or link strength

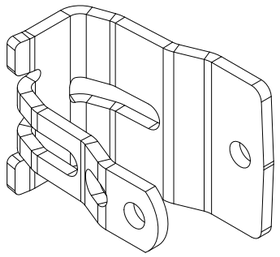
SHORTENING

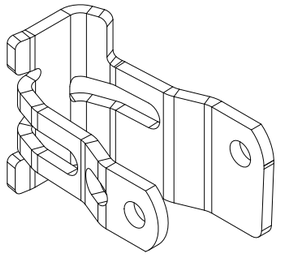
- Lift the cross rod which will be cut. (this will tent the belt and keep other parts safe from damage)
- Use a grinding tool or cutter to carefully cut the cross rod at both belt edges
  - At a TwenteFlex link; cut the cross rod in the space between the inner legs of the two links.
  - At a TwenteSideFlex link; cut the cross rod between the link and the spiral mesh/plastic overlay of the belt.
- Remove the pieces of cross rod from the links
- Remove the cross rod
- Preferably remove or add an even number of pitches



TECHNICAL DATA SHEET

Materials	AISI 304/302 (standard) and 316			
Belt pitch	40 mm		1.57 inch	
Cross rod diameter	6 mm		0.236 inch	
Overall belt width	380 - 1270 mm		15 -50 inch	
Inside turn radius	1.6 - 1.9 - 2.2 - 2.5 - 2.8		x belt width	
Belt strength in turns	200 kg		440 lbs	
Belt strength on straights	400 kg		880 lbs	
Available spiral wire diameters	ø 1,2 mm		18 ga	
	ø 1,4 mm		17 ga	
	ø 1,6 mm		16 ga	
	ø 1,8 mm		15 ga	
Available lateral pitch spiral wire	4,2 mm	72 loops / foot	7,3 mm	42 loops / foot
	4,6 mm	66 loops / foot	8,5 mm	36 loops / foot
	5,1 mm	60 loops / foot	10,2 mm	30 loops / foot
	5,6 mm	54 loops / foot	12,7 mm	24 loops / foot
	6,4 mm	48 loops / foot	16,9 mm	18 loops / foot
Available plastic overlay	POM	Not flame retardant. (may catch fire, when in contact with flames)		
(both materials are food approved)	PA6 FR	Flame retardant with a UL V2 approval. (extinguishes when on fire)		
Open area plastic overlay	53 %			
Link height	40 mm		1.57 inch	
Link thickness	3 mm		0.12 inch	
Link width	35 mm		1.37 inch	
Available TwenteSideFlex links	Solid integral guard edge (above and below the belt surface)		Opening for horizontal/airflow (above the belt surface) (only applicable for straight through systems)	



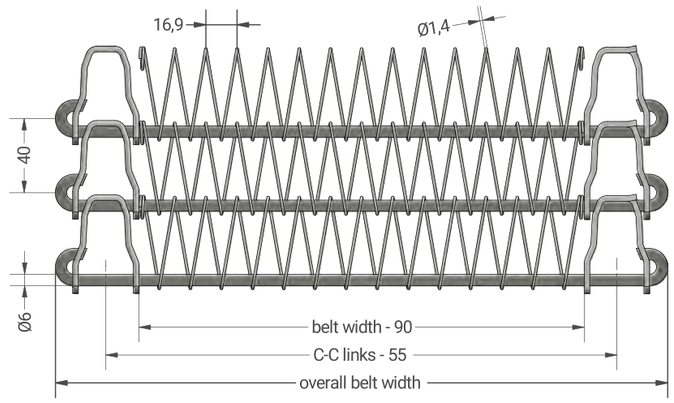


Uni-directional systems	Uni-directional systems only run up or down (or twin spiral) (TwenteSideFlex link on the outside belt edge and TwenteFlex link on inside belt edge)			
Bi-directional systems	Bi-directional systems run up and down on the same spiral (TwenteSideFlex link on both the inside- and outside belt edge)			
C-C links	Belt width - 55 mm		Belt width - 2.16 inch	
Usefull belt width between links	Belt width - 90 mm		Belt width - 3.54 inch	
Available sprockets sizes	16 teeth - 18 teeth			
Maximum sprocket tension	125 kg		275 lbs	
Available sprocket material	PA6G (Nylon) (-60 to +60 °C)			
	POM (Acetal) (-60 to +60 °C)			
	Stainless steel			

Type designation (example)

TSF 16.9 - 40 - 1.4 - 6 / R2.2

TSF	=	TwenteSideFlex	1.4	=	Spiral wire diameter
16.9	=	Lateral pitch spiral wire (or POM / PA6 FR)	6	=	Cross rod diameter
40	=	Pitch	R2.2	=	Inside turn radius (2.2 x belt width)



ABOUT TWENTEBELT

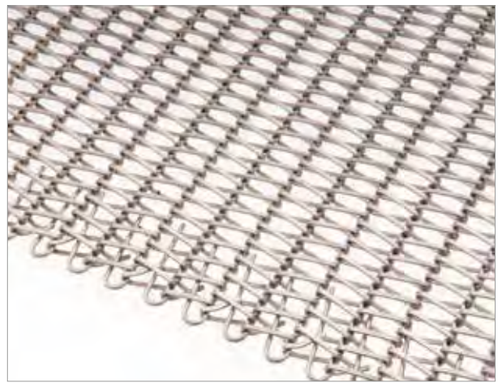
Twentebelt of the Netherlands has been specialised in metal conveyor belts for over 100 years. Twentebelt develops, produces, supplies and maintains a wide range of metal belts of different types and alloys. With our products and supporting activities we can meet the various requirements of application in o.a. the food-, chemical-, pharmaceutical- and packaging industries. Practically every belt is produced and adjusted to the specific applications of our customers. In the field of eyelink belts Twentebelt has become the worldwide market leader.

Do you require a different or special conveyor belt that is not listed?
Please contact us to discuss the possibilities.

IMPRESSIONS OF OTHER PRODUCT GROUPS

Wire mesh belt

Eyelink belt



Spiral woven belt

TwenteFlex™ belt

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