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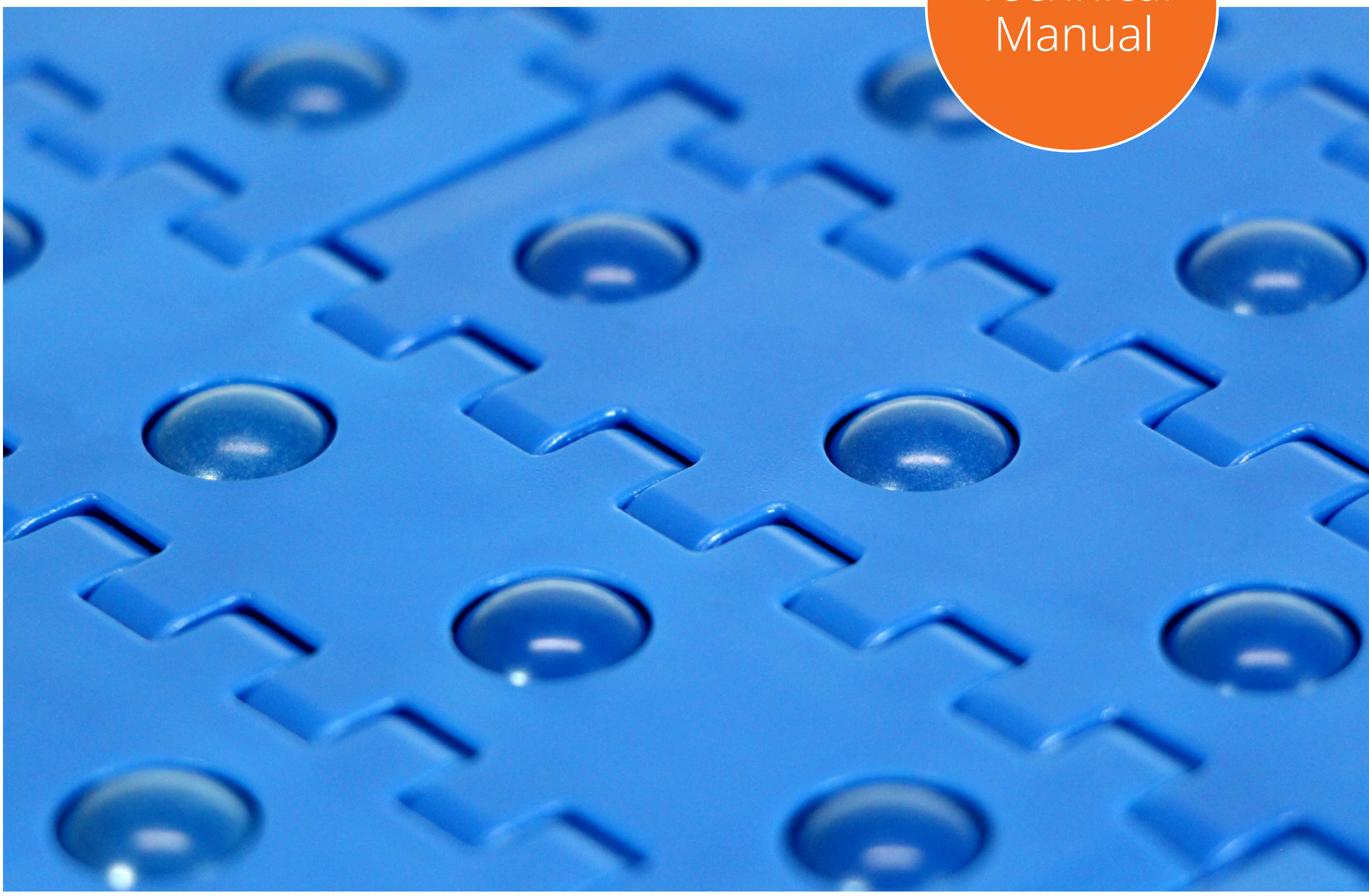


Technical Manual

uni QNB Ball
Technical Manual

Innovation and
Service in Belting

Table of Contents

Introduction

The principles contained in the uni QNB Ball technical manual have been designed to assist designers of conveyors to create effective and innovative applications with this unique belt technology.

uni QNB Ball belts are part of the uni QNB product series, bringing a track record that has been established for over 10 years. With this technical manual we have tried to simplify the many possibilities there are with the uni QNB Ball belt. This has been done by the use of sketches, pictures and tables. At end of this manual you will find formulas which can be used to design conveyors with special need for product movement.

How it works?

Transported goods are supported on the top of a grid of balls which are embedded into the uni QNB belt. The bottom of the balls are in contact with a secondary belt or a stationary sliding bed placed directly below fully supporting the transported goods via the balls. When running over wear beds or fixed wear strips you only need to run the uni QNB Ball belt at half of the needed product speed. This will reduce the generated noise from the uni QNB Ball belt compared to products running on a normal uni QNB belt without balls. It will also increase the life time of the uni QNB Ball belt.

The uni QNB belt only acts to control the spacing of the balls. The transported load is fully supported via the balls Movement across the belt is possible without the need for guidance removing the risk of marking the goods when contacting side guides or diverter arms. It is also to ensure that the goods do not turn due to the friction between the goods and the guidance.

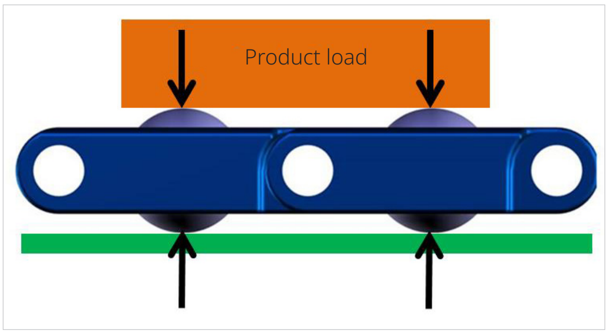


Fig 1
Load is supported totally by uni QNB Balls.
No load is supported on the uni QNB links.

Understanding Movements

If the uni QNB Ball belt is running over fixed wear strips then the rotation of the balls (Rb) will generate a linear increase of the product speed (Vip) equal to the linear speed of the uni QNB Ball belt (Vb).

The speed of the product (Vp) standing on top of the balls under perfect conditions will then be
(Vb) + (Vip) which is equal to 2 x (Vb).
Product speed may vary depending of the weight and the shape of the product.

Vp = Speed of the product
Vb = Speed of the QNB Ball belt
Rb = Direction of ball rotation

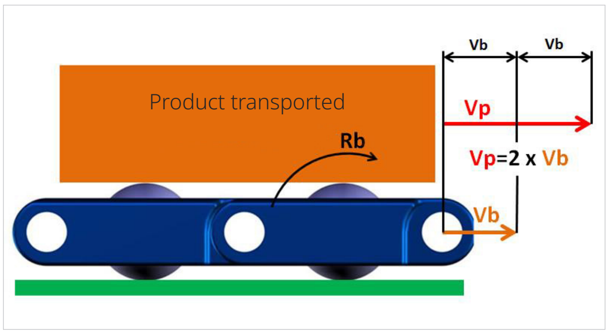


Fig 2
Fixed support surface

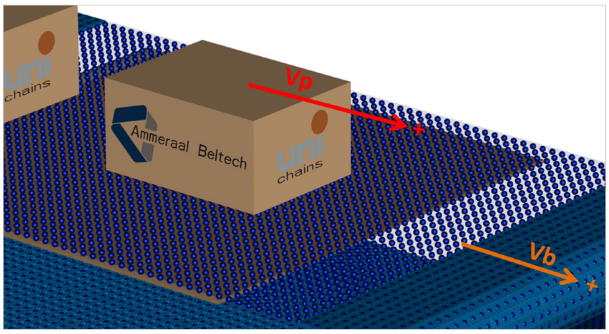


Fig 3

If instead of having fixed wear strips supporting the balls on the bottom side you mount a longitudinal conveyor with a flat synthetic belt from Ammeraal Beltech you will then be able to have full control of the speed of the product (Vp) by changing the speed of the flat synthetic belt (Vs).

The increase of the product speed (Vip) is in this case:
Vip = Vb + Vs. meaning that the product speed (Vp) = Vb + Vip is equal to 2 x Vb + Vs.

Speed of the secondary belt (Vs) positive opposite to the speed of the uni QNB Ball belt. This is because the opposite running direction of the secondary belt will increase the product speed (Vp).

Vp = Speed of the product
Vb = Speed of the QNB Ball belt
Vs = Speed of the secondary belt
Rb = Direction of ball rotation

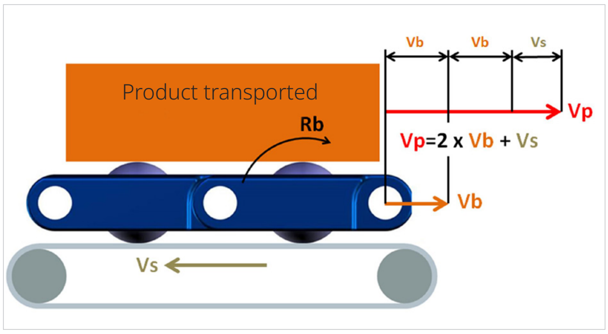


Fig 4

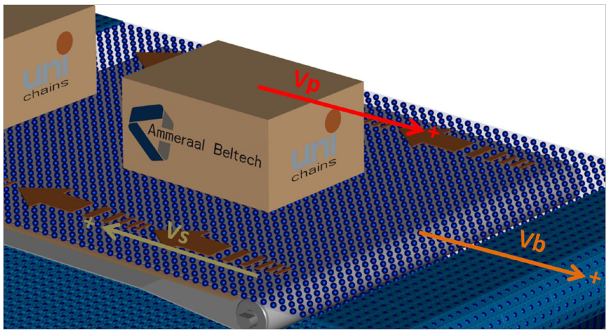


Fig 5

Product speed (Vp) longitudinal movement	
Vb = 0 and Vs = 0 then product speed Vp = 0	Product not moving
Vb = 0 and Vs > 0 then product speed Vp = Vs	Product moves in + direction with the speed Vs
Vb = 0 and Vs < 0 then product speed Vp = -Vs	Product moves in - direction with the speed Vs
Vb > 0 and Vs = 0 then product speed Vp = 2 x Vb	Product moves in + direction with the speed 2 x Vb
Vb > 0 and Vs > 0 then product speed Vp = 2 x Vb + Vs	Product moves in + direction with the speed 2 x Vb + Vs
Vb > 0 and Vs < 2 x Vb then product speed Vp = 2 x Vb - Vb	Product moves in + direction with the speed 2 x Vb - Vb
Vb > 0 and Vs = -2 x Vb then product speed Vp = 0	Product is not moving
Vb < 0 and Vs = 0 then product speed Vp = -2 x Vb	Product moves in - direction with the speed 2 x Vb
Vb < 0 and Vs > 0 then product speed Vp = -2 x Vb + Vs	Product moves in - direction with the speed 2 x Vb - Vs
Vb < 0 and Vs < 2 x Vb then product speed Vp = -2 x Vb + Vb	Product moves in - direction with the speed -2 x Vb +Vb
Vb < 0 and Vs = 2 x Vb then product speed Vp = 0	Product is not moving

Table 1

uni QNB Ball conveyor with secondary belt mounted perpendicular to the uni QNB Ball belt

The difference in speed between the uni QNB Ball belt and the secondary belt depend upon which angle (αp) is needed. The table below shows the factor between the two belts at a specific product angle. It is not recommended to use a larger (αp) than 60°. If a bigger angle is needed. then consider another way to achieve that angle.

αp = Angle of product leaving the QNB Ball belt

Ex. If you want the product to leave the uni QNB Ball belt at an angle of 40° compare to the running direction of the uni QNB Ball belt. Then the speed of the secondary belt (Vs) must be 1.68 x the speed of the uni QNB Ball belt (Vb).

Formula: Vs = Vb x Sf

Speed factor (Sf) between (Vb) and (Vs) as a function of (αp)						
Angle by the product (°)	10	20	30	40	50	60
Speed factor between (Sf). (Vb) and (Vs)	0.35	0.73	1.15	1.68	2.38	3.46

Table 2

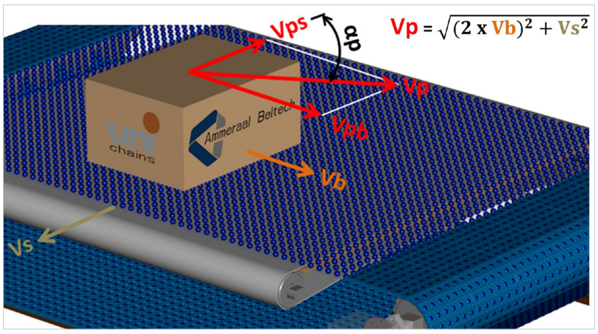


Fig 6

Supporting the uni QNB Ball belt on the carry section

It is recommended that the uni QNB Ball belt is fully supported either by a wear bed or by a secondary belt. This avoids product load pushing the ball out of the belt. See fig 7. When the uni QNB Ball belt is fully supported by a wear bed on the carry section, the speed of the product will be two times the uni QNB Ball belt speed. If the belt is supported by a secondary belt, the product speed can be controlled by the speed and running direction of the secondary belt.

The recommended material of the wear bed is PEHD1000 or similar quality. It may be necessary to use an antistatic material or at least to ensure that the carry section is connected to the ground/earth. If the ball for some reason may not rotate but a closed carry bed is still needed, the wear bed can be made with grooves. In this case the product speed will be equal to the uni QNB Ball belt speed. The risk of this design is that the pressure of the load may press the ball out of the uni QNB belt. So it is important that the weight of the product is equally divided over as many balls as possible. See fig 8.

It is important that dimension (a) and (b) is created so there will be no risk of ball touching the sliding sheets. It is recommended dimension is (a) 15.0 mm (0.59 in) and dimension (b) is a minimum of 3.0 mm (0.12 in). This way of supporting the belt can also be used on the return section if a closed return section is needed. A closed return section may cause visible wear marks on the top side of the belt if this is being used in an abrasive environment. It is not recommended that the balls are activated when the uni QNB Ball belt runs in return because this will have a negative influence upon the life time of the balls or the uni QNB link. Extruded wear strips can be used when it is not required to activate the balls on the carry section in an open design. See fig 9.

Open support sections on the carry section can be used as “cleaning sections” because they will allow dust and other elements to fall though the carry section.

Minimum number of supports:
- Narrow belts (Belts from 153.0 mm to 305.0 mm / 6.02 in to 12.00 in) min 2 supports.
- Belts wider than 305.0 mm (12.00 in) it is recommend at least one support every 150.0 mm (5.91 in) of the belt width.

It is recommended to use an extruded wear strip in PEHD1000 material or similar material.

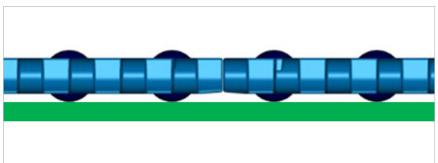


Fig 7
uni QNB Ball belt fully supported by wear bed on the carry section

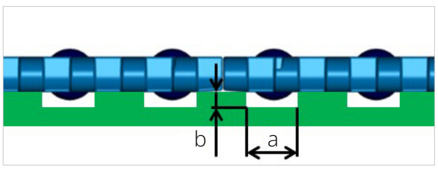


Fig 8
uni QNB Ball belt supported by closed carry bed with grooves

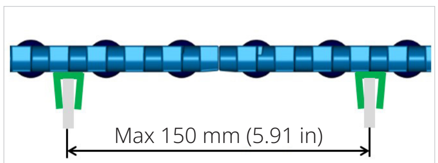


Fig 9
Example of extruded wear strips supporting the uni QNB Ball belt on the carry section

Supporting the uni QNB Ball belt on the Return Section

Support of the uni QNB Ball belt on the return should be between the balls: It is not recommended that the balls are in contact with the return support. It is recommended that this is either done by discs, rollers or shafts with grooves.

Free hanging return sections may be possible with conveyors with a centre to centre distance of less than 2000.0 mm (78.74 in).

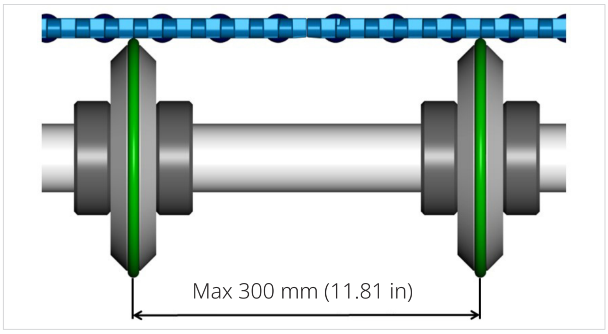


Fig 10
Discs supporting the uni QNB Ball belt on the return section
Use discs with a rubber ring to ensure that they will always rotate

Shaft / rollers with grooves supporting the uni QNB Ball belt on the Return Section

It is important that dimension (a) and (b) is created so there will be no risk of the balls contacting the roller surface. It is recommended that dimension (a) is 15.0 mm (0.59 in) and dimension (b) is a minimum of 3.0 mm (0.12 in).

To ensure that the balls are in-line with the grooves then it is important that the tracking of the belt is controlled.

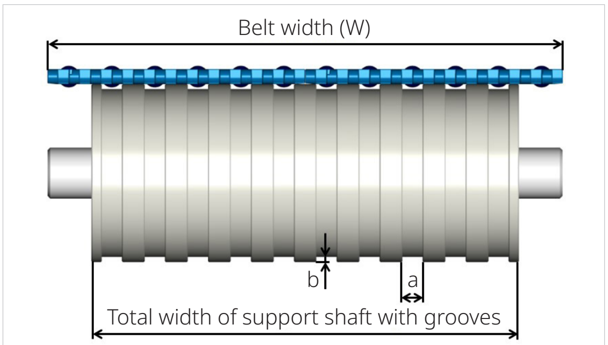


Fig 11
Shaft with grooves supporting the uni QNB Ball belt on the return section

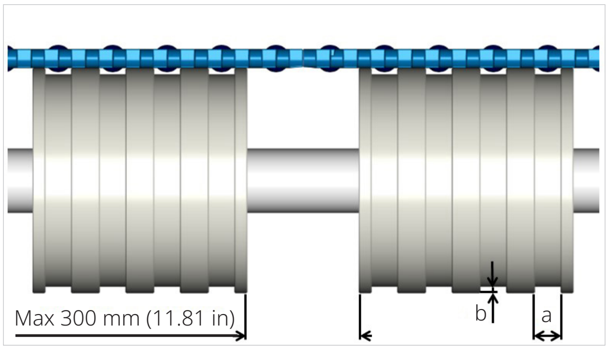


Fig 12
Rollers with grooves supporting the uni QNB Ball belt on the return section

Driving the uni QNB Ball belt

Traditional end drive
Most applications with uni QNB Ball can be created with a traditional end drive where the motor is placed at the end of the conveyor. However, it may be necessary to lower the return section to ensure that there is enough space for the secondary belt conveyor if it is placed close to the drive unit. It is important that the weight of the belt in the catenary sag is high enough to ensure that there is always tension in the belt from the drive sprocket to the support roller before the catenary sag. See fig 13.

The maximum recommended speed with uni QNB Ball belt and traditional end drive is 50 m/min. A higher speed is possible but it may increase the noise and reduce the lifetime of the uni QNB Ball belt. At a speed of 50 m/min the ball will rotate with a speed of approx. 1250 RPM, which of course will lead to wear on the ball and on the ball lock. Therefore it is not recommended to run at high speed in abrasive environments.

Conveyors with center drive
If the requirement is to run the uni QNB Ball belt in both directions this can be achieved by making the conveyor with a center-/omega drive. With a center drive it is recommended that the wrapping angle (αd) of the belt around the sprocket is between 120°-175°. If the wrapping angle (αd) is below 120° the risk of disengagement is high. If the wrapping angle (αd) is higher than 175° there will be a risk that the belt will not come off the sprocket on the return side and the belt will start to vibrate. The distance from the center of the drive sprocket to the center of the support roller closest to the drive sprocket (H) must be a minimum of 3 pitches 76.2 mm (3.00 in). Due to the high tension on the support rollers it is important that the support rollers do not touch the ball as this may cause the balls to pop out of the uni QNB link.

The recommended minimum diameter of the support roller (Dsr) is 80.0 mm (3.15 in) even though the minimum backflex diameter of the uni QNB Ball belt is 50.0 mm (1.97 in). A larger diameter is required because the tension on support rollers is high. When having center/omega drive it´s important to either having space for a catenary sag each side of the center/omega drive. The weight of the belt in the catenary sag must be high enough to ensure that there is always tension in the belt around the drive sprocket otherwise there will be a risk of losing the engagement between the drive sprocket and the uni QNB Ball belt.

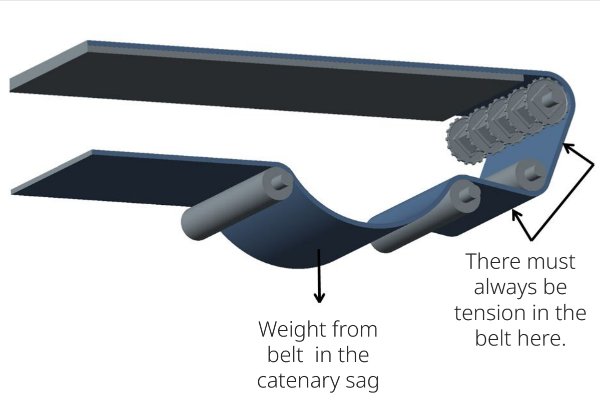


Fig 13

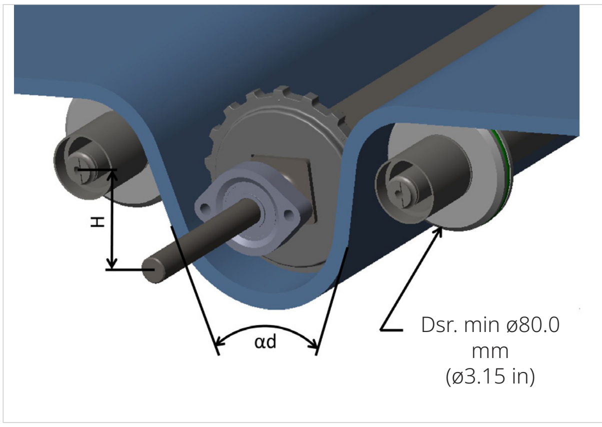


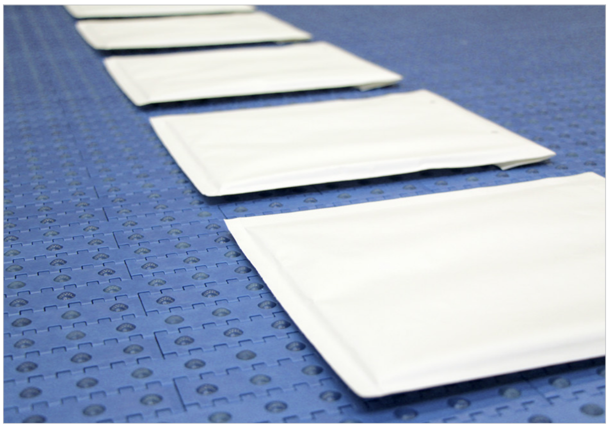
Fig 14

What can be transported on uni QNB Ball belt?

The majority of applications where the uni QNB Ball belt will be a perfect choice is in the logistic industry where there is a need for transporting card board boxes, small packages, letters and envelopes. Internal tests have shown that all products of this type (from heavy card board boxes to very light letters) can easily be transported and fully controlled on the uni QNB Ball belt.

Even though card board boxes may be the primary product type for the uni QNB Ball belt. Tests haves shown that it will only be your imagination setting the limit for which products can be transported on the uni QNB Ball belt! Tests have been performed with many different types of products e.g. trays, plastic and metal grooved bottom boxes, paper and plastic bags containing flour/pet food etc.

The maximum load on one ball (L.Ball) is 0.5 kg (1.10 lb) but this figure depends upon the shape and hardness of the product in contact of the balls. If you are concerned about the suitability of certain products to be used on the uni QNB Ball belt, then please contact us. We have in-house facilities to test such applications, so please send us samples of the product you wish to be tested. We can support you with videos/movie clips of the testing we perform to support your developments.



Belt Specification

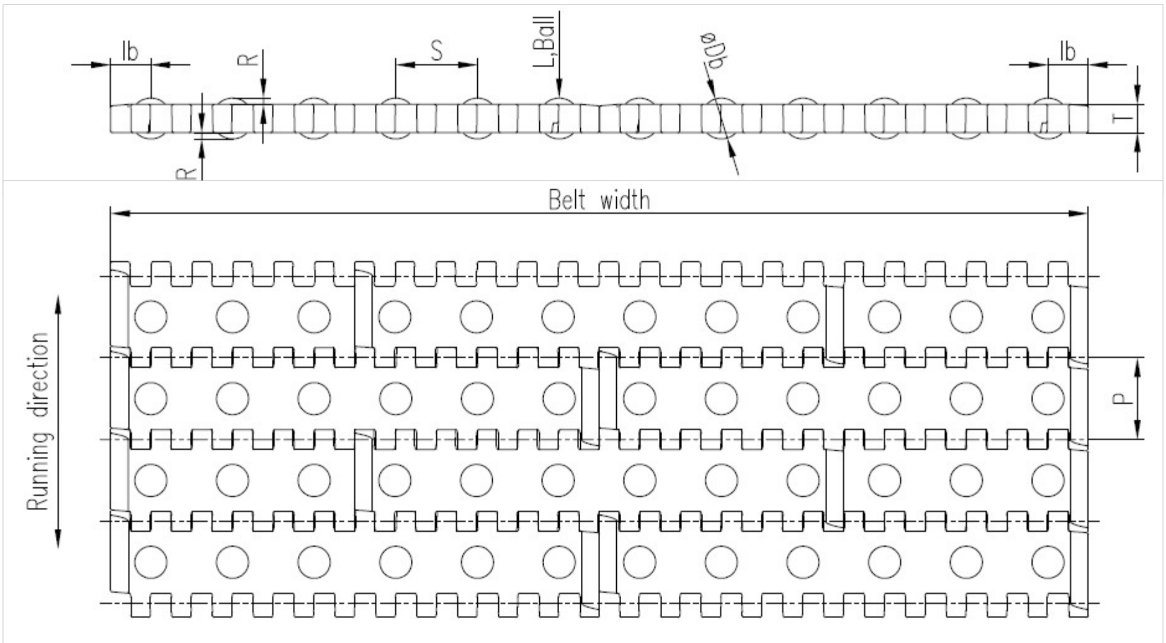


Fig 15

Dimensional Belt Specification – uni QNB Ball													
Nominal belt pitch		Belt thickness		Pin diameter		Ball diameter		Spacing between the balls		Standard indent to first ball		Balls protrude top and bottom	
(P)		(T)		(Dp)		(Db)		(S)		(Ib)		(R)	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
25.4	1.00	8.8	0.35	5.0	0.20	12.7	0.50	25.4	1.00	12.7	0.50	1.95	0.08

Table 3

Technical belt specification – uni QNB Ball									
Surface opening		Pin type		Max belt speed		Back-flex radius		Belt weight	
%				(v)[1]		(Br)[2]		(Bw)[3]	
				m/min	ft/min	mm	in	kg/m²	lb/ft²
0 (Closed)		Lockpin		50	164	25.0	0.98	9.3	1.91
Number of balls		Max load per ball		Max area load		Permissi-ble tensile strength		Max load per sprocket	
(Nb)		(L.Ball)[4]		(Al)		(F.perm)[5]		(Fs)[6]	
Pcs/m²	Pcs/ft²	kg/ball	lb/ball	kg/m²	lb/ft²	N/m	lbf/ft	N	lbf
1550	144	0.50	1.10	775	159	22500	1542	1840	414

Table 4

1. Recommended maximum uni QNB Ball belt speed. Product speed can be different from this speed depending upon rotation direction of the balls if they are activated under the product.
2. Please be aware that backflex radius and backflex wrapping angle can have a big influence upon the tension in the belt.
3. Is the belt weight of a uni QNB Ball belt in standard POM-SLF with PP pins.
4. Maximum load per ball is the maximum dynamic load on one ball based upon a product with a hard smooth bottom surface. This value can vary depending upon the hardness and shape of the bottom surface of the product.
5. Is the permissible tensile strength of a uni QNB Ball belt in standard POM-SLF with PP pins.
6. Is the maximum load per sprocket when the uni QNB Ball belt is in standard POM-SLF with PP pins.

Sprocket Specification

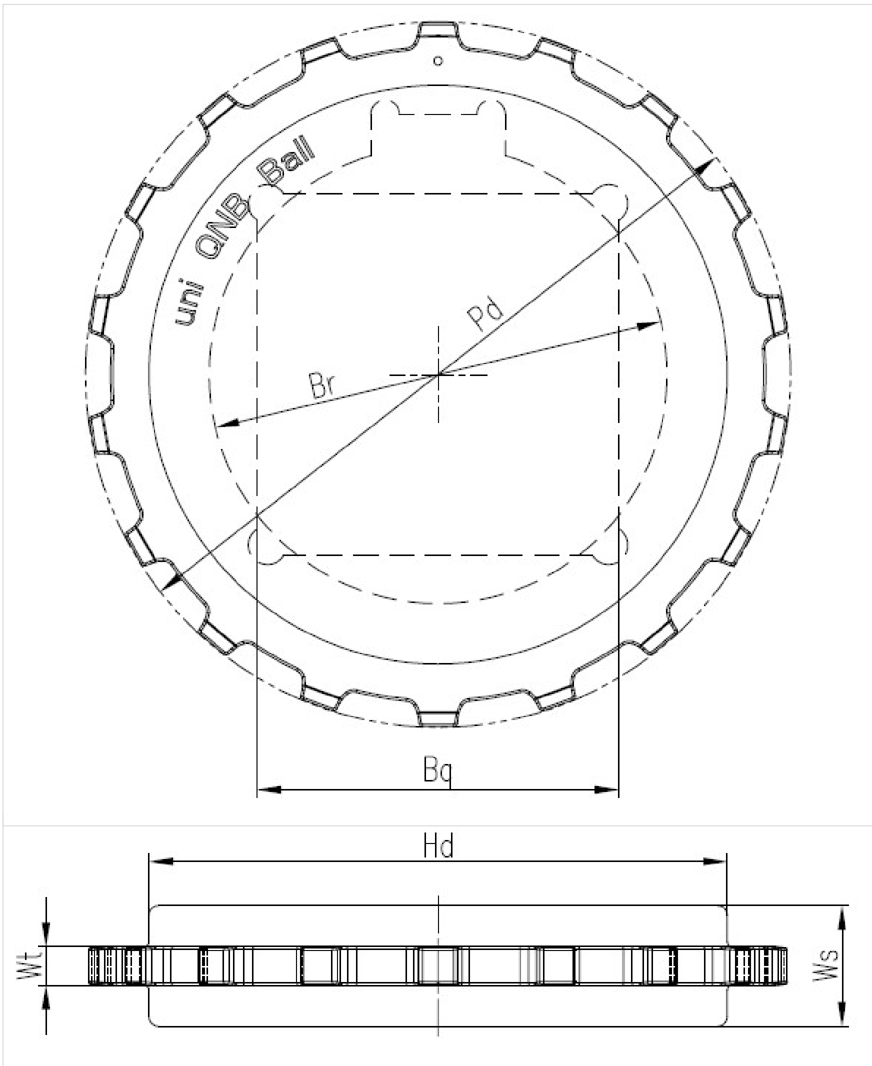


Fig 16

Standard sprockets for QNB Ball														
No. of teeth	Pitch diameter		Hub diameter		Width of sprocket		Width of teeth		Maximum round bore		Maximum square bore		Maximum load per sprocket	
	(Pd)		(Hd)		(Ws)		(Wt)		(Br)		(Bq)		(Fs)	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	N	lbf
15	122.5	4.82	100.0	3.94	25.0	0.98	8.0	0.31	76.2	3.00	63.5	2.50	1840	414
18	146.3	5.76	120.0	4.72	25.0	0.98	8.0	0.31	95.3	3.75	76.2	3.00	1840	414
19	154.3	6.07	125.0	4.92	25.0	0.98	8.0	0.31	95.3	3.75	82.6	3.25	1840	414

Table 5

Notes:

1. Sprocket with other sizes is available upon request.
   Ammeraal Beltech Modular A/S does not recommend smaller drive sprocket than Z8.
2. Maximum load per sprocket is based upon a sprocket width (Wb) of 25.0 mm (0.98 in) + standard belt material POM-SLF. If stronger sprockets are needed then these can be supplied with a sprocket wider than 25.0 mm (0.98 in).

All possible sprocket positions in uni QNB Ball belts in standard widths

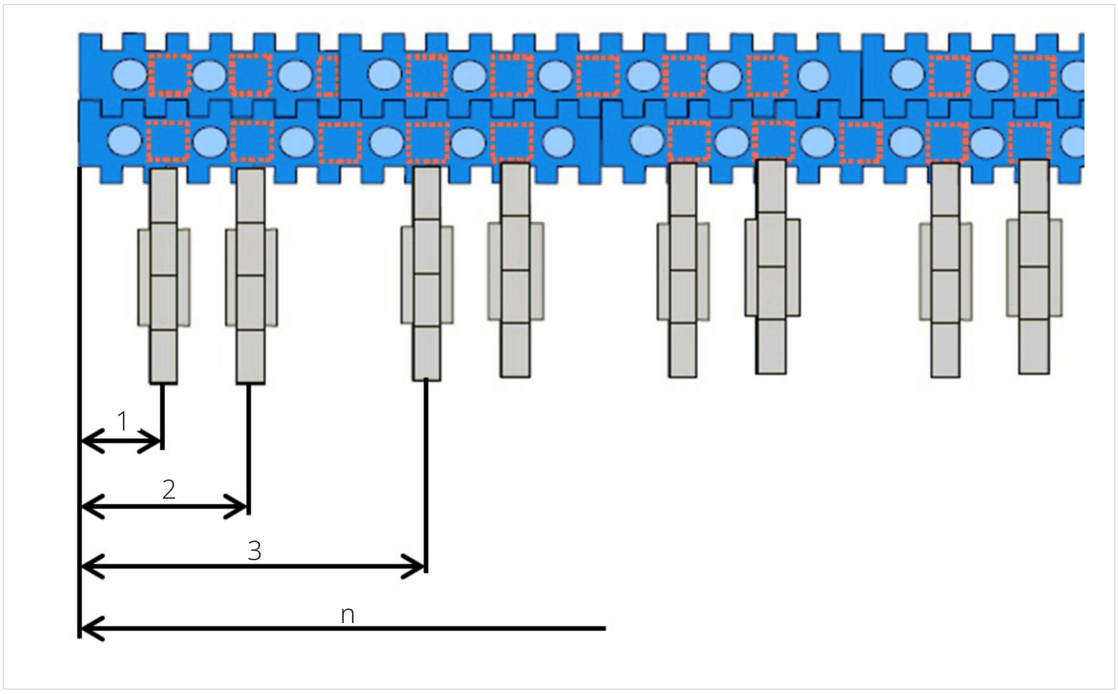


Fig 17

Position of sprocket from left side of the belt										
Sprocket no:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Distance from left side (mm)	25.3	50.7	101.3	126.7	177.3	202.7	253.3	278.7	329.3	354.7
Distance from left side (in)	1.00	2.00	3.99	4.99	6.98	7.98	9.97	10.97	12.97	13.96
Sprocket no:	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Distance from left side (mm)	405.3	430.7	481.3	506.7	557.3	557.3	633.3	658.7	709.3	734.7
Distance from left side (in)	15.96	16.96	18.95	19.95	21.94	21.94	24.93	25.93	27.93	28.92
Sprocket no:	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Distance from left side (mm)	785.3	810.7	861.3	886.7	937.3	962.7	1013.3	1038.7	1089.3	1114.7
Distance from left side (in)	30.92	31.92	33.91	34.91	36.90	37.90	39.89	40.89	42.89	43.88

Table 6

The distance from the left side of the belt and into a sprocket with an even sprocket no. (Sdl,even) can be calculated by the use of the following formula:

Formula (mm) Sdl,even = (75,999 x n) / 2 – 25,333
Formula (in) Sdl,even = (2,992 x n) / 2 – 0,997

Ex. Distance from left side of the belt and into sprocket no. 26:
Sdl,even = (75,999 x 26) / 2 – 25,333 = 962,7 mm
Sdl,even = (2,992 x 26) / 2 – 0,997 = 37,90 in

The distance from the left side of the belt and into a sprocket with an odd sprocket no. (Sdl,odd) can be calculated by the use of the following formula:

Formula (mm) Sdl,odd = (75,999 x n) / 2 – 12,667
Formula (in) Sdl,odd = (2,992 x n) / 2 – 0,499

Ex. Distance from left side of the belt and into sprocket no. 27:
Sdl,odd = (75,999 x 27) / 2 – 12,667 = 1013,32 mm
Sdl,odd = (2,992 x 27) / 2 – 0,499 = 39,89 in

Types Of Applications

Speed control of product
Products arrive from downstream conveyor or on uni QNB Ball conveyor with non-activated balls and enter a section on the uni QNB Ball conveyor where the balls are activated by a secondary belt.

Vb	=	Speed of the uni QNB Ball belt (m/min)
Vs	=	Speed of the secondary belt (m/min)*
Vp1	=	Product speed when entering the uni QNB ball belt or when the product is running on non-activated balls (m/min)
Vp2	=	Product speed in the section with activated balls (m/min)
Vp3	=	Product speed when leaving the uni QNB Ball belt or when product is again running on non-activated balls (m/min)
DVp	=	Difference in product speed from product running on non activated balls to product running on activated balls (m/min)
Tpa	=	Time product is running on activated balls (sec)
Ls	=	Length of secondary belt/activation zone (mm)
Psb	=	Space between the products before the secondary belt/activation zone (mm)
Pse	=	Space between the products after the secondary/activation zone (mm)

*Speed of the secondary belt (Vs) is in the formulas
calculated positive opposite to the speed of the uni QNB Ball belt. This because it will increase the product speed (Vp)

Formulas:
Vp1 = Vb
Vp2 = (2 x Vb) + Vs
Vp3 = Vb = Vp1
DVp = Vb + Vs
Tpa = (0.06 x Ls) / DVp
Ls = 16.7 x Tpa x DVp
Pse = Ls + Psb

This kind of application is often used when the customer wants to separate or assemble the products.
If Vs = 0 then Vp2 = 2 x Vb the product will be moving with double speed.

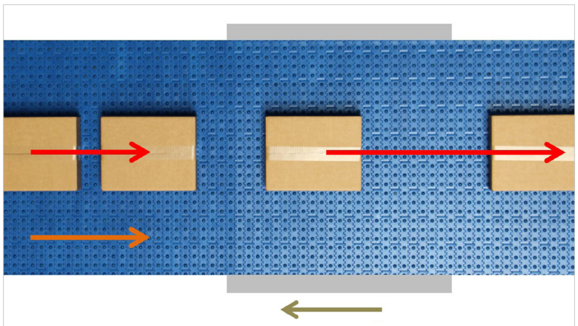


Fig 18

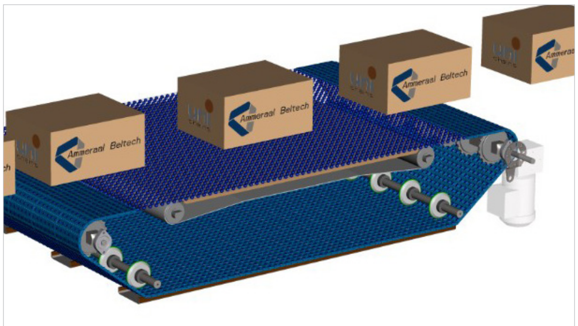


Fig 19

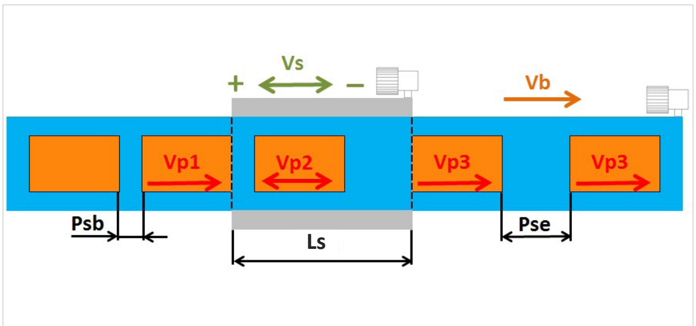


Fig 20

Dynamic Product Divert

Speed control of product

Products arrive from downstream conveyor or on uni QNB Ball conveyor with non-activated balls and enter a section on the uni QNB Ball conveyor where the balls are activated by a secondary belt. The gap is automatically formed when balls are in contact with the secondary belt. Product transfers to either the left or the right and the angle of divert depends upon belt speeds.

Vb	=	The speed of the uni QNB Ball belt (m/min)
Vs	=	The speed of the secondary belt (m/min)
Vp1	=	Product speed when enter the uni QNB Ball belt or when product is running on non-activated balls (m/min)
Vp2	=	Product speed in the section with activated balls (m/min)
Vp3	=	Product speed when leaving the uni QNB Ball belt or when product is again running on non-activated balls (m/min)
Vp4	=	Product speed when leaving the uni QNB Ball belt or if Va = 0 (m/min)
αd	=	Angle of the product
Ws	=	Width of secondary belt (mm)
Py	=	Lateral movement of the product (mm)
Tpa	=	Time product is running on activated balls (sec)

Formulas:

Vp1 = Vb
Vp2 = √(2 x Vb)2 +Vs2
αd = ATAN(Vs / (2 x Vb))
Vs = 2 x Vb x TAN(αd)
Ws = 16,67 x Vp2 x COS(αd) x Tpa
Py = 16,67 x Vp2 x SIN(αd) x Tpa
Tpa = Ws / (16,67 x Vp2 x COS(αd))

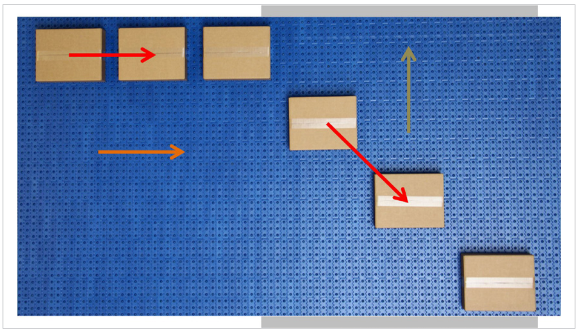


Fig 21

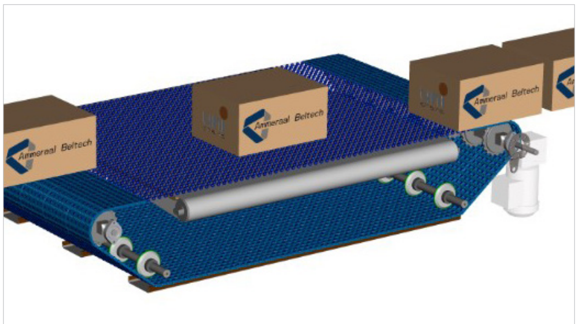


Fig 22

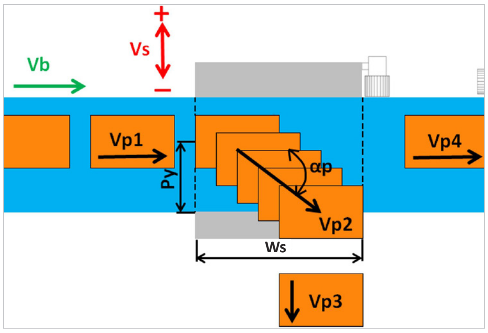


Fig 23

Static Product Divert

Products arrive from a downstream conveyor or on a uni QNB Ball conveyor with non-activated balls. When the product enters the section where the secondary belt has a speed of (Vs) = 0 m/min, the product speed will increase by 100% and a gap will be created between the products. The size of the gap will depend upon the time the product is running over the secondary belt. The uni QNB Ball belt stops and the secondary belt will start to move. the product will then be transported 90° to either the left or the right side. The product speed (V3) will depend upon the speed of the secondary belt (Va).

Vb	=	The speed of the uni QNB Ball belt (m/min)
Vs	=	The speed of the secondary belt (m/min)
Vp1	=	Product speed when entering the uni QNB Ball belt or when product is running on non-activated balls (m/min)
Vp2	=	Product speed in the section with activated balls (m/min)
Vp3	=	Product speed when leaving the uni QNB Ball belt on a 90° angle (m/min)
Vp4	=	Product speed when leaving the uni QNB Ball belt or when product is again running on non-activated balls (m/min)
Ws	=	Width of secondary belt (mm)
Pl	=	Length of the product longitudinal in relation to the running direction of the uni QNB Ball belt (mm)
Px	=	Longitudinal movement of the product (mm)
Tpa	=	Time product is running on activated balls (sec)

Formulas:

Vp1 = Vb
Vp2 = 2 x Vb
Vp3 = Vs
Vp4 = Vb
Ws = Pl + Px
Px = (Vp2 x Tpa) / 60000

Minimum value => Px = 0
Tpa(min) = (0.06 x Pl) / Vp2
Ws = 16.7 x Tpa x Vp2
Ws(min) = Pl (Px = 0)
Tpa(min) = (0.06 x Pl) / Vp2

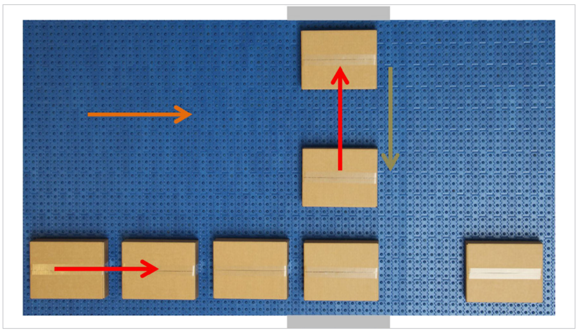


Fig 24

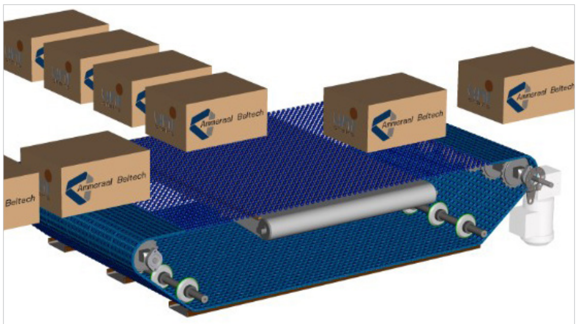


Fig 25

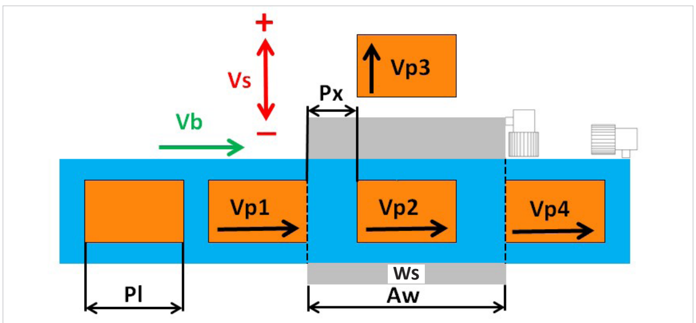


Fig 26

Sorting

Products arrive from a downstream conveyor or from a uni QNB Ball conveyor with non-activated balls and enter a section on the uni QNB Ball conveyor where the balls are activated by a secondary belt. If the speed of the secondary belt is Vs) = 0 m/min then the product will move in a straight line with the speed (Vp3S) = 2 x Vb.

If the secondary belt runs in positive direction (+) then the product will move to the right side of the uni QNB Ball belt at a speed (Vp3R) depending upon the speed Vb and Vs(+). If the secondary belt runs in a negative direction (-) then the product will move to the left side of the uni QNB Ball belt at a speed (Vp3L) depending upon the speed Vb and Vs(-).

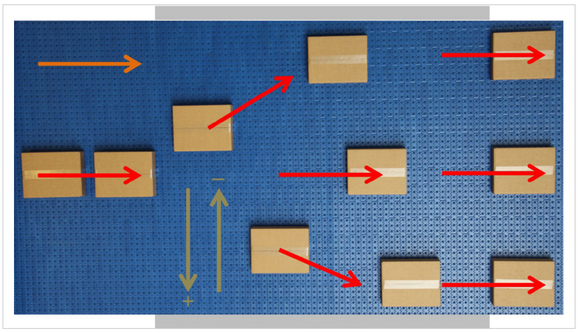


Fig 27

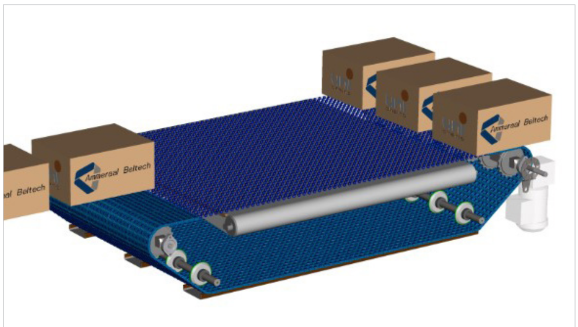


Fig 28

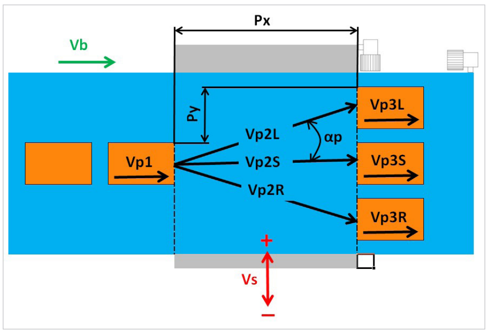


Fig 29

Merging

Products arrive from a downstream conveyor in two or more rows and you want to get the products into a single row. The dotted line on the sketch below shows how it is possible to create the required gaps between the products to enable merging of the products at a later stage.

In this example the product in the middle is running over the activated roller longer than the product on the left and right. This means that the middle product will run at double speed for the whole (b) length. The product on the left will only run at double speed for the length (a) from end of dimension (a) to end of dimension (b). The product on the left will run at the same speed as the uni QNB Ball belt. The product on the right will run at the same speed as the uni QNB Ball belt for whole (b) length. This is a simple and cheap way to generate gaps between the products.

When the product on the left is 75% of the way over the secondary belt, then the product will be transported to the center of the uni QNB Ball belt. The same will happen with the product on the right just a little bit later than the product on the left.

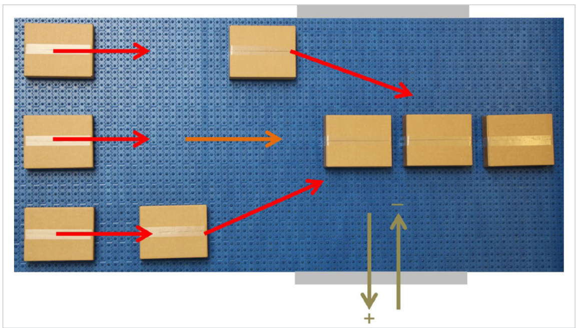


Fig 30

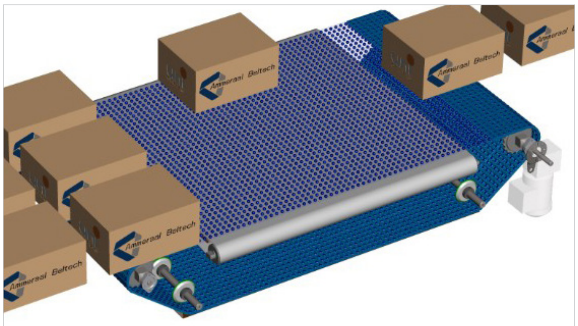


Fig 31

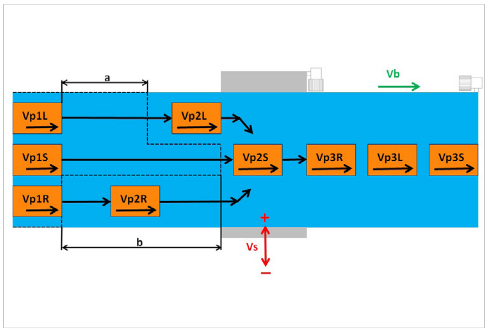


Fig 32

Product Rotation

Products arrive from a downstream conveyor or from a uni QNB Ball conveyor with non-activated balls and enter a section on the uni QNB Ball conveyor where there are two parallel secondary belts mounted longitudinal to the uni QNB Ball belt. If these two secondary belts run with a different speed or run in opposite directions then the product on top of the uni QNB Ball belt will start to rotate.

Vb	=	The speed of the uni QNB Ball belt (m/min)
VsL	=	The speed of the left secondary belt (m/min)
VsR	=	The speed of the right secondary belt (m/min)
Vp1	=	Product speed when entering the uni QNB Ball belt or when product is running on non-activated balls (m/min)
Vp2	=	Product speed in the section with the two parallel secondary belts (m/min)
Vp3	=	Product speed when leaving the uni QNB Ball belt or when product again is running on non-activated balls (m/min)
Ls	=	Lengths of secondary belts = the needed distance of making the rotation
αp	=	Angular rotation of the product (°)

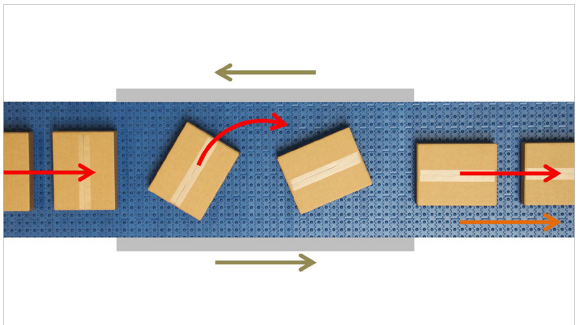


Fig 33

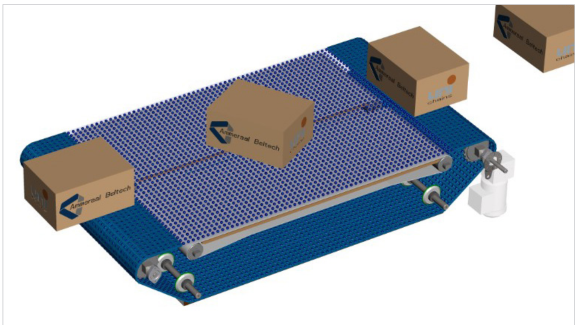


Fig 34

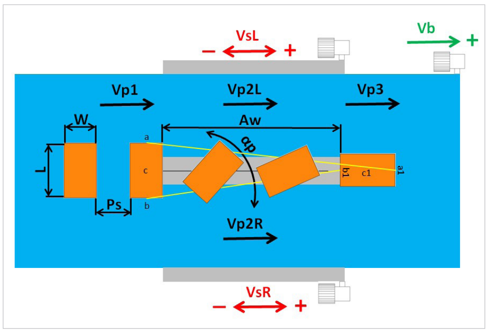


Fig 35

Cleaning Guidelines

To ensure the functionality of the uni QNB Ball and to extend its lifetime, it is recommended that the belt is kept clean at all times. In applications with paper dust or similar dusty environments we recommend to mount a brush across the entire belt width. The position of the brush is just to ensure that the belt and the balls are cleaned constantly when the uni QNB Ball belt is running.

If the balls are not kept clean then there is a risk that they will stop rotating. If too many of the balls stop rotating then the functionality of the uni QNB Ball belt will no longer be as expected. With non-rotating balls there will be a risk that the balls will discolor the product. If the pressure on the ball is too it may damage the product.

For further information regarding cleaning, see the Engineering Manual page 81.

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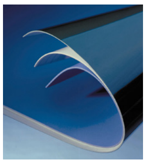
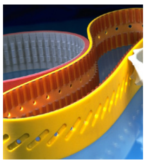
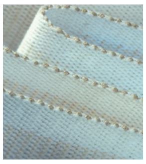
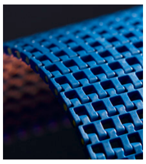
Synthetic Belts


Engineered Belts


Endless Woven Belts


Homogeneous Belts


Modular Belts


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