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The Trusted Metal Conveyor Belt Manufacturer™

Flat-Flex® Conveyor Belt

Support Guide

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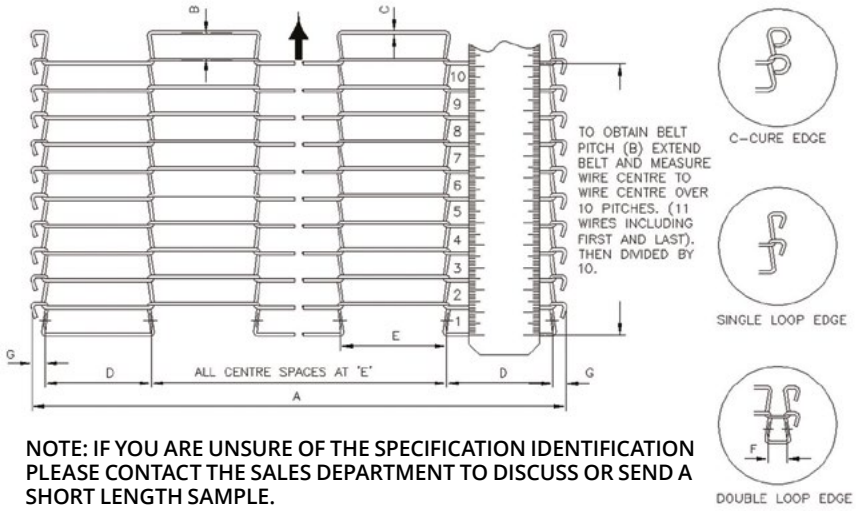
Table of Contents

Flat-Flex® belt identification form

MACHINE SUPPLIER DETAILS			
MAKE OF MACHINE		MACHINE TYPE	
COUNTRY OR ORIGIN		MACHINE SUPPLIER PART No.	

BELT IDENTIFICATION DETAILS				
WIDTH (TOTAL). mm	A		TYPE OF EDGE LUG FINISH (SLE DLE OR C-CURE)	
PITCH. mm (SEE INSTRUCTION BELOW)	B		TOTAL NUMBER OF SPACES ACROSS BELT. (E + D)	
WIRE DIAMETER. mm	C		MATERIAL (STL/STL OR C.S. MUSIC WIRE)	
FIRST SPACE WIDTH. mm	D		LENGTH REQUIRED (5 MTRS MIN)	M
CENTRE SPACE WIDTH(S). mm	E		WIRE BELT Co. PART No. (IF KNOWN)	
DOUBLE LOOP SPACE WIDTH. mm	F		ADDITIONAL COMMENTS	
SINGLE LOOP SPACE WIDTH. mm	G			



NOTE: IF YOU ARE UNSURE OF THE SPECIFICATION IDENTIFICATION PLEASE CONTACT THE SALES DEPARTMENT TO DISCUSS OR SEND A SHORT LENGTH SAMPLE.

Flat-Flex® single loop edge (SLE) using full strand joining method

Tools you will need:

- Safety glasses
- Flat end pliers
- Needle nose pliers
- Cable ties/soft wire/string (optional)
- Cutting pliers
- Wire straightener (optional)
- Necessary tools for conveyor belt take up adjuster

1. BEFORE YOU BEGIN JOINING

- Slacken any belt take up adjuster to allow the maximum take up capability when belt is fitted.
- If possible move the two ends of the belt to be joined to the discharge end of the conveyor unit. This may help to hold the belt in position whilst joining.
- Confirm that the edge loops are curving back away from the direction of belt travel **(as shown in Diagram 1)**. If not, check to be sure that the belt is not threaded backwards on the conveyor.
- Remove a strand (joining strand) from one end of the belt, or spare belt roll and lay the strand down between the two belt edges and check to see that the edge loops are going in the same direction as the belt's edge loops. (The strand must also be "right side up" for it to lay flat. You will know immediately if you have installed the joining strand "wrong side up" and will have to start over.)
- If necessary you may want to attach the two ends of the belt together, to maintain stability, using cable ties, soft wire or string in the outside spaces (see diagrams 1 & 2 below).

2. BEGIN JOINING IN THE CENTRE

- FLEX the strand from each side enough to INSERT the ends into the two spaces next to the centre space **(Spaces A and B - Diagram 1)**.
- INSERT the strand ends up through the centre space of the opposite near side edge **(Space C - Diagram 2)**.
- Pull the ends of the strand through until the centre space "locks" in place.
- Use pliers or the Wire Belt wire straightening tool to STRAIGHTEN the wire in the centre space (Once the centre is connected, you may remove the ties holding the belt edges together).

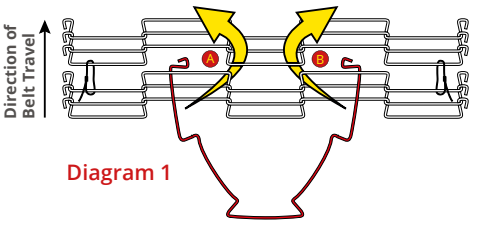


Diagram 1

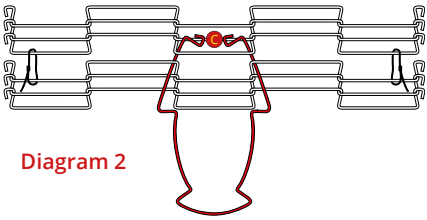


Diagram 2

3. WEAVE STRAND TO ONE SIDE

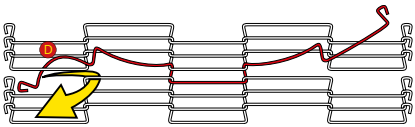


Diagram 3

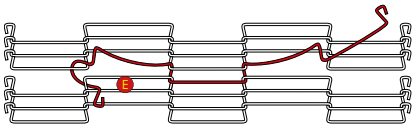


Diagram 4

- FLEX or BEND in the centre of the next space and INSERT it down through and around the Z-bend in this space on the belt end wire closest to you (Space D on Diagram 3). **NOTE: ALWAYS TRY TO AVOID BENDING THE WIRE AT THE Z-BEND!**
- BEND the wire toward the centre and INSERT up through and around the Z-bend next to the centre space (Space E on Diagram 4).
- Pull the strand wire through the mesh and STRAIGHTEN it with your pliers or wire straightener. **TIP: PULL THE STRAND IN THE DIRECTION THAT IT GOES THROUGH THE Z-BEND LINKS.**
- Repeat these three moves until you reach the side edge of the belt (Diagram 5).
- Using your pliers, connect the join strand's edge loop to the belt's edge loop on the near edge by hooking the lug edge up through Space F on Diagram 5.

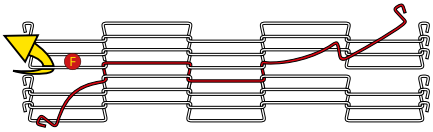


Diagram 5

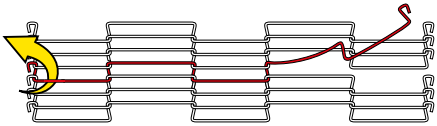


Diagram 6

- Connect the edge loop on the far edge of the main belt to the strand's edge loop by gently flexing the outer space strand up through the connected join strand using your flat nose or needle nose pliers (Diagram 6).
- STRAIGHTEN the strand with your pliers

4. WEAVE STRAND TO THE OTHER SIDE

- Repeat number 3 on page 6, going in the opposite direction, weaving to the other side edge of the belt (Diagrams 3 through 6).
- If you are installing a new belt, you are finished joining.

5. CHECK DRIVE SHAFT SPROCKET ALIGNMENT

- There should be a 3-5mm clearance between all sprockets (and/or blanks) and the Z-bends next to them.
- Check alignment of sprocket teeth with a straight edge (only necessary if the sprockets are not keyed to the Drive Shaft).
- Drive shaft set up should be according to the 'Standard Arrangement'.

6. CHECK DRIVE SHAFT SPROCKET ALIGNMENT

- Z-bends should NOT come in contact with ANY conveyor component (including end rolls, wear strips, transfer support rails or nose bars, etc.).
- Adjust as needed.

7. ADJUST TENSION

- Flat-Flex® is a low tension belt. Use minimal tension... only enough so that drive sprockets properly engage the belt.
- Run conveyor and check to be sure it runs smoothly.
- **NOTE: TOO MUCH TENSION WILL CAUSE PREMATURE BELT FAILURE!**

IMPORTANT NOTES:

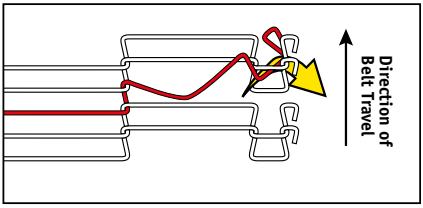
- Avoid permanent deformation of the 'Z' form links when joining. To assist it may be necessary to place a bend in the wire space adjacent to the space being woven; how ever you must ensure that this wire bend is straightened before continuing the joining operation. Re-straightening of wires at this stage or at the end of joining can be achieved using the flat end or needle nose pliers or wire straightener.
- Avoid any bending of the join strand wire in their vertical plane. Any necessary bending of the wire strand should take place in the horizontal plane.
- For wider belts it may be necessary to secure the 2 ends together at more regular intervals across the belt which can be removed as the strand is woven towards the outside edge.

Flat-Flex® double loop edge (DLE) using full strand joining method

Tools you will need:
• Safety glasses • Flat end pliers • Needle nose pliers • Cable ties/soft wire/string (optional) • Cutting pliers • Wire straightener (optional) • Necessary tools for conveyor belt take up adjuster

THE FORMAT FOR WEAVING OF THE JOIN STRAND IS AS PER THE SINGLE LOOP EDGE INSTRUCTIONS APART FROM THE JOINING OF THE EDGE ASSEMBLY. SEE PAGES 5-7 FOR SLE JOINING INSTRUCTIONS.

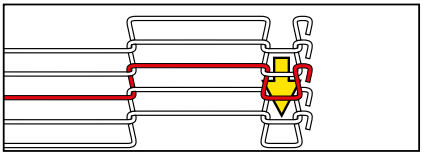
1. **DIAGRAM A**



- At the last space before the double loop edge, gently bend the joining strand in the centre of the last space.
- Insert the end of the joining strand into the double loop edge (small space) on the near side. You will need to rotate the wire to feed the DLE through the space.

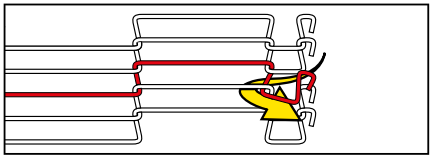
NOTE: IF YOU HAVE DIFFICULTY WITH THIS PROCESS YOU MAY UNHOOK THE MAIN BELT NEAR EDGE LUG FIRST AND THEN RE-CONNECT THIS AT THE FINAL STAGE OF THE PROCESS.

2. **DIAGRAM B**



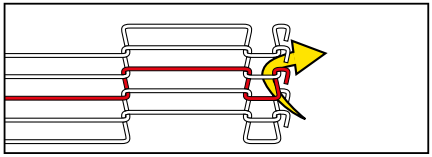
- Insert needle nose pliers from underneath, grab the centre of DLE on strand and pull up into space.
- Straighten initial bend.

3. **DIAGRAM C**



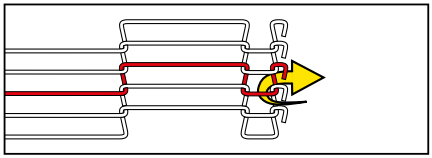
- Flex the belt by pushing down in centre of last row of spaces on the near edge.
- Rotate joining strand so you can push the end up from underneath the last space on far edge.
- Hook DLE up over last large space Z-bend.
- Straighten any distortion to this connected Z-bend using needle nose pliers or the 'Eddie' wire straightener.

4. **DIAGRAM D**



- Connect the splice strand edge hook to the near side loop edge using pliers hooking up under the near edge strand.

5. **DIAGRAM E**



- Connect the far side loop edge by hooking it into the splice strand using pliers.
- Connect the opposite edge of the belt in the same manner, only in mirror image.
- Straighten any bends in wire strands.

IMPORTANT NOTES:

- Avoid permanent deformation of the 'Z' form links when joining. To assist it may be necessary to place a bend in the wire space adjacent to the space being woven; however you must ensure that this wire bend is straightened before continuing the joining operation. Re-straightening of wires at this stage or at the end of joining can be achieved using the flat end or needle nose pliers or wire straightener.
- Avoid any bending of the join strand wire in the vertical plane. Any necessary bending mof the wire strand should take place in the horizontal plane.

Make Flat-Flex® endless using joining tubes

Application – To join a new belt or to repair a damaged belt.

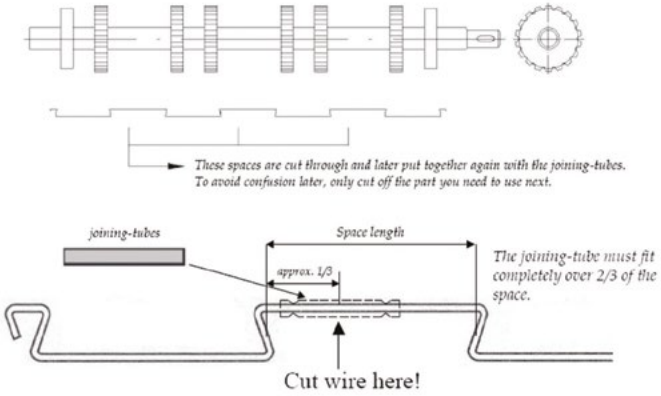
PLEASE NOTE: Before undertaking any other method of belt joining, including the tube method described here, it is important that a risk assessment is undertaken and that all applicable regulations are complied with.

Tools you will need:	Notes:
• Safety glasses • Needle nose and / or Flat end pliers • Wire straightener (optional) • Cutting pliers	• For added security of the tube you can crimp the tube twice on each side of the cut wire position. Also, with some care, you can gently squeeze the tube at the cut wire position to prevent any sideways movement of the tube. Take care not to cut through the tube. • For wider belts it may be necessary to tie the two ends of the belt together with cable ties – removing them as you work across the belt.

Where should the space wire be cut?

The first cut is made at one third of the length of the space, exclusively in those spaces that are not driven – the odd numbered spaces.

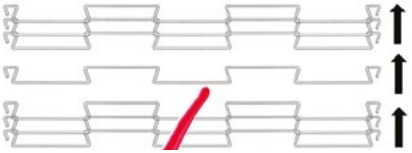
CAREFUL: The cut must ALWAYS be set so that the joining-tube can be pulled completely over the longer part of the cut wire section.



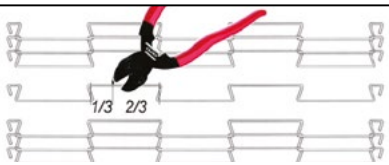
JOINING TUBES are available from Wire Belt Company to suit all belt wire diameters. Please contact our Customer Service Team.

PROCEDURE:

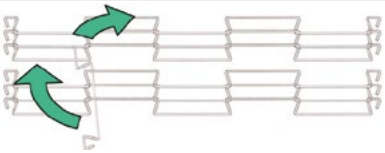
- First relax off belt tension adjuster.
- Then carefully unzip from the upper end of the belt a single strand to be used for joining.



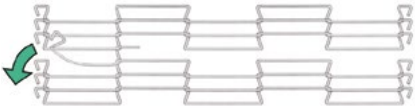
- Make the first cut as shown.
- Please only cut the part that you would like to weave next, to avoid later confusion of parts.



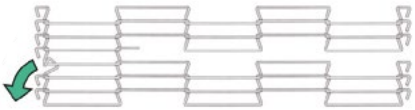
- Now push the short piece of the cut space through the second space of the lower belt and up through the first space of the upper belt end. Turn the parts clockwise, so that the Z-form joins both belt ends.



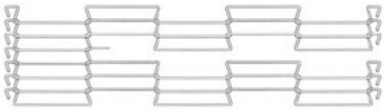
- Now push the join strand edge-loop up into the upper loop edge through the first space.



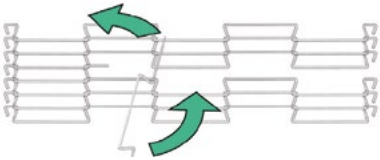
- With pliers, take the lower edge loop and hook it up through the first space to loop the edges together.



- Straighten wire with pliers or wire straightener. The first stage is completed.

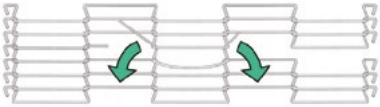


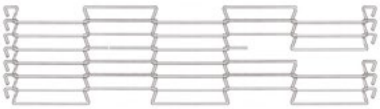
- Now cut through the second part as shown right.
- As shown place the longer space wire length down into the second space on the lower belt end and up into the third space on the upper end. Turn the part anti-clockwise into the spaces.



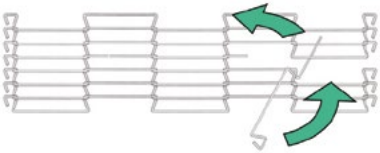
- Now insert the short end down through the 4th space on the lower end of the belt and up through the 3rd space in the upper belt end (use pliers if necessary). Then straighten the strand section.
- Step 2 is now complete.

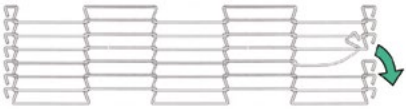
WITH BELTS THAT HAVE MORE THAN 5 SPACES REPEAT THESE STEPS UNTIL THE LAST SPACE.



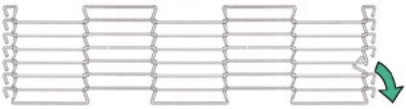


- With the last space place the long end of the cut wire section down through the 4th space on the lower belt end and up through the last (5th) space on the upper belt end. Turn the wire section anti-clock into the spaces to lock in the Z-bend link assembly.
- Now push the join strand edge-loop up into the upper loop edge through the last space.

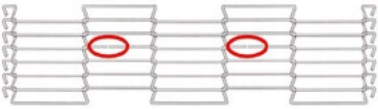




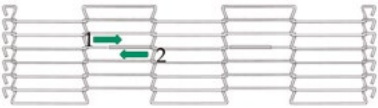
- With pliers take the lower edge loop and hook it up through the last space to loop the edges together. Again straighten the bent strand.



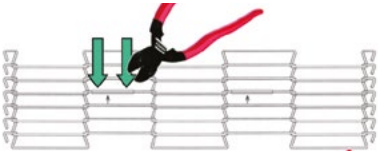
- The last step is to join the cut wires using the joining tubes.



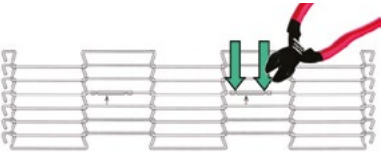
- First push the joining-tube over the 2/3 part of the second space. Then pull the tube back over the 1/3 part. Repeat across width.
- **ATTENTION: DO NOT PUSH THE TUBE RIGHT UP TO THE Z-FORM OF THE SPACE. LEAVE A MINIMUM SPACE OF 5mm.**



- Now with the cutters squeeze, with care, the joining-tube onto each end of the cut wires to firmly fix the tube in place.
- Be careful not to squeeze at the cut wire position (marked by the black arrow in the drawing). See notes below.



- Repeat these steps with the remaining tube join sections.



- That was it! Now you have finished and your belt is endless.
- **NOTE:** For added security of the tube you can crimp the tube twice on each side of the cut wire position. Also, with some care, you can gently squeeze the tube a the cut wire position to prevent any sideways movement of the tube.
- For wider belts it may be necessary to tie the two ends of the belt together with cable ties - removing them as you work across the belt.
- Tube joins are available from Wire Belt Company to suit all belt wire diameters. Please contact Cutomer Services.

Flat-Flex® single loop edge installing joining clip method

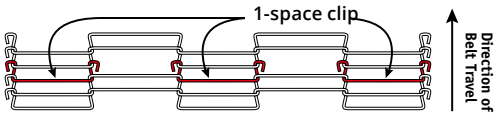
Splice clips come in two varieties: single space and 3-space clips. The 3-space clip is obviously stronger because its centre space is woven into the belt as in the full strand splice method. These two types of clips should be used together, whenever possible to create a stronger splice and to help minimize the spacing gaps in the belt. (For example, a 7-space belt could be joined using two 3-space clips... whereas, a 9-space belt would use 1 single and two 3-space clips. See How Many Clips.)

Tools you will need:

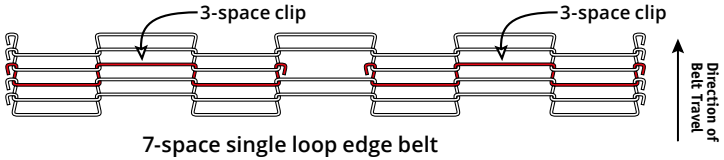
- Safety glasses
- Flat end pliers
- Needle nose pliers
- Cable ties/soft wire/string (optional)
- Wire straightener (optional)
- Necessary tools for conveyor belt take up adjuster

IMPORTANT NOTES:

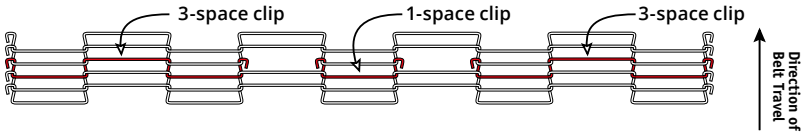
- Two different end loops from adjacent clips cannot be attached to the same Z-bend. Only one splice clip end loop per Z-bend is allowed.
- If a belt has damage in more than one place on account of fatigue, do not try to repair it. Install a new belt. Also, never save old belts to use for repairs because they have already been weakened from use. Purchase several extra metres of new belt to use exclusively for repairs.
- The use of clips produces a double space pitch gap between adjacent clips and you should fully assess their use for both the product process and safe use in the operating environment.



5-space single loop edge belt



7-space single loop edge belt



9-space single loop edge belt

1. **BEFORE YOU BEGIN JOINING**
   - Turn off and lockout power to the conveyor.
   - Slacken any belt take up adjuster to allow the maximum take up capability when the belt is fitted.
   - If possible move the two ends of the belt to be joined to the discharge end of the conveyor unit. This may help to hold the belt in position whilst joining.
   - If necessary you may want to attached the two ends of the belt together, to maintain stability, using cable ties, soft wire or string in the outside spaces. For wider belts it may be necessary to secure the 2 ends together at more regular intervals across the belt, which can be removed as the clips are woven in.
   - Plan out the number, type and placement of splice clips by laying them out in position across the belt.
   - Make certain that no two edge loops on the clip hook around the same Z-bend and that all closed loop edges point in the direction of belt travel.

2. **BEGIN INSTALLATION WITH THE CENTRE SPACE**
   - If installing a single clip install the clip around the centre space on the far end of the belt.
   - Using needle nose pliers grip the splice clip, and in turn hook the two single loop edges up through and into the centre space on the opposite belt end.
   - -OR- If a 3-space clip is used:
   - Gently bend the clip in the centre and insert the clip ends down into the spaces either side of the centre space.
   - Then insert the clip ends up through and into the centre space of the opposite belt end and pull through until the centre “locks” into place.
   - Then, gently straightening the wire, hook the single loop edge down through and around the space adjacent to the centre space.
   - Use the needle nose pliers to grip the single loop edge, hook it up through and into the space adjacent to the centre space on the opposite end of the belt. Repeat for other edge loop.
   - Straighten the wire with pliers or the wire straightener tool.

3. **INSTALL THE NEXT SPLICE CLIP ON AN OUTSIDE EDGE IF A SINGLE CLIP IS USED**
   - Remove the tie holding the ends together.
   - Insert the splice clip around and through the far end edge space of the belt.
   - Connect the splice clip edge loop to the near side belt edge by gently flexing the splice clip edge loop up and through the near side outside space. The use of needle nose or flat end pliers may help in this process.
   - Grip the splice clip with your pliers and hook the second edge loop up through and around the adjacent Z-bend on the near end of the belt.
   - -OR- if a 3-space clip is used:
   - Remove the ties holding the edges together.
   - Bend and insert the splice clip around the second space in from the belt edge and insert the clip ends up through the second space into the opposite end of the belt. Pull through until centre locks in place.

- Using needle nose pliers connect the splice clip edge loop to the near side belt edge by gently flexing the splice clip edge loop up and through the near side outside space. Then hook the far outside edge loop up through the edge of the splice clip.
- Then on the other end of the splice clip hook it down through space number three on the far belt edge, then flex the edge loop down and up through second space on the near end of the belt.
- Straighten wire with pliers or Wire Belt's Wire Straightening tool.

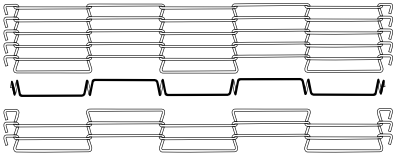
4. **Install splice clip on the opposite edge**
   - Install the same type of splice clip on the opposite edge in the same way.
5. **Install the remaining splice clips**
   - Install the remaining splice clips as appropriate across the belt. There should be the exact same number and type of splice clips on either side of the centre clip (the first clip you installed).
6. **Re-adjust the conveyor belt tension**

How Many Clips?		
No. of Belt Spaces	**Single Clips**	**Single + 3-Space Clips**
3	2	0 + 1
5	3	1 + 1
7	4	0 + 2
9	5	1 + 2
11	6	0 + 3
13	7	1 + 3
15	8	0 + 4
17	9	1 + 4
19	10	0 + 5
21	11	1 + 5
23	12	0 + 6
25	13	1 + 6
27	14	0 + 7
29	15	1 + 7
31	16	0 + 8
33	17	1 + 8
35	18	0 + 9
37	19	1 + 9
39	20	0 + 10
41	21	1 + 10
43	22	0 + 11
45	23	1 + 11
47	24	0 + 12
49	25	1 + 12

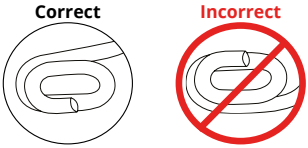
Flat-Flex® single loop edge using EZ-Splice® belt joining method

Tools you will need:
• Safety glasses • EZSplice Strand • Profiling Pliers

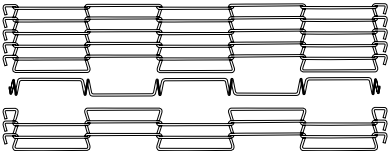
- Place the EZ-Splice® strand between the two ends of the belt to be joined, match and align the spaces of the strand with the spaces of the belt.



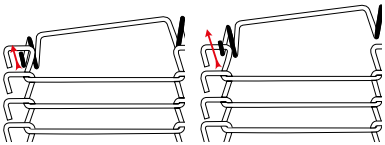
- Make sure that the cut end of the EZ-Splice® strand is on the bottom.



- Once both ends of the belt are aligned with the spaces in the EZ-Splice® strand, turn the EZ-Splice® strand over and hook both end loops in as shown below.



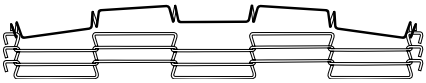
- Hook end loop in place.



- Repeat opposite end.

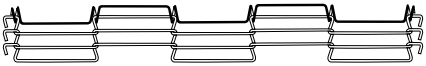
- EZ-Splice® with end loops hooked.

- Now that you have both end loops hooked, turn the EZ-Splice® strand 180° or 1/2 turn.

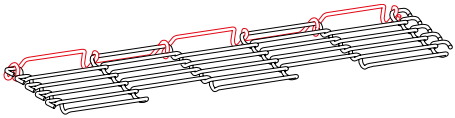


- Turn and insert the second space of the EZ-Splice® strand through the second space of the belt to be joined and repeat every other space until the end of the belt is reached.

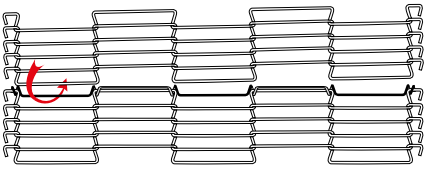
- Now the bottom half of the joint is completed.



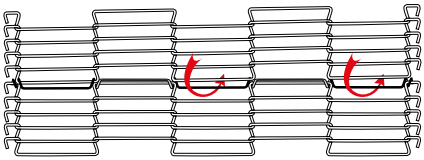
- Once the bottom half is all locked into the appropriate spaces across the width of the belt, turn the EZ-Splice® strand about 1/4 of a turn or about 90° up as shown.



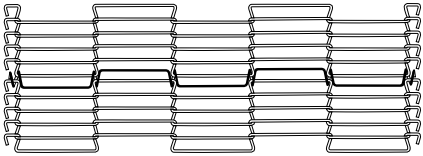
- Take the top half of belt and hook the first space over and through the first space of the EZ-Splice®.



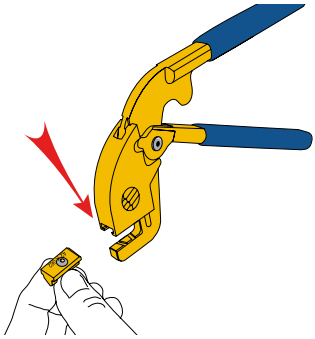
- Then repeat every other space until the end of the belt is reached.



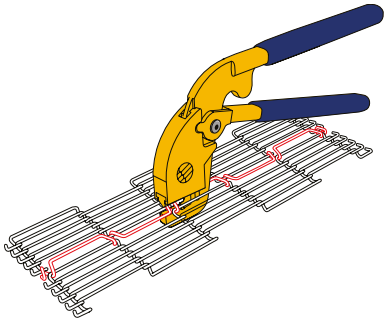
- Now that joint is in place, you will use the profiling pliers and follow the steps below to lock your EZ-Splice® in place.



- Insert the beveled edge of the correct bit into the jaw slot of the pliers, pushing in with your index finger until you hear a click indicating that the bit is locked into place. Make sure to use the correct bit that matches your belt.



- Starting in the centre of the belt to be crimped, insert the lower jaw of the profiling pliers into the joining strand, match the joint bend of the strand up with the corresponding groove on the lower jaw of the profiling pliers and crimp down.
- Moving outward, insert the lower jaw into the next joint bend making sure to match it up again with the corresponding groove on the lower jaw. Repeat until the end of the belt is reached.
- Crimp the Z bends in the splice strand to the proper profile height to insure required belt clearance throughout the conveyor circuit. Profile pliers will bot tom out when fully crimped.



Inspection and installation check list

YES	NO	BEFORE YOU BEGIN JOINING THE BELT
		Power to the conveyor is disconnected
		Wearing safety glasses
		Correct tools on hand
		All tensioning mechanisms released
		Belt threaded onto conveyor right (smooth) side up
		Loop edges curve back away from direction of belt travel
		Belt edges tied together with wire, twine, plastic, or wire tie
		AFTER JOINING/INSTALLATION COMPLETED
		Check drive sprocket alignment for 3 to 5mm clearance with Z-Bends
		Check sprocket teeth alignment (Not needed if shaft is “keyed”)
		Check position of the wear strips and adjust if making contact with the Z-bends
		Check belt tracking in grooved end rolls and transfer rollers
		Retighten/adjust tension
		Test tracking by running belt without product; adjust belt
		Check for proper disposal of old wire and all wire pieces
		Tools returned to proper storage locations
		CONVEYOR SAFETY CHECK
		Are operating instructions clearly listed or posted?
		Are safety guards adequate to prevent accident and injury?
		Are limit switches and alarms working?
		Personnel know location of emergency stop/control switches
		ROUTINE MAINTENANCE INSPECTION/EVALUATION
		Check belt surface for bent or broken wire strands; straighten or repair immediately
		Check splice clips (if used) for wear/damage
		Check all conveyor components for excessive wear (drive sprockets, blanks, wear strips, etc.); replace if needed
		Check sprocket alignment for 3 to 5mm clearance
		Check sprocket teeth alignment (Not needed if shaft is “keyed”)
		Check position of wear strips and adjust if making contact with Z-bends (belt joints)
		Check belt tracking in grooved end rolls and transfer rollers
		Check tension, adjust tension mechanisms as necessary
		Check levelness of conveyor frame
		Test tracking by running belt slowly without product

Belt maintenance tools

EDDIE WIRE STRAIGHTENERS PART NUMBER 017007

- High quality wire straightening tool.
- Remove distortions in the wire and adjust Z-bends.
- Perfect for opening and closing C-Cure edge loops.
- Suitable for wire diameters from 0.90 to 2.35mm.

UNIVERSAL CUTTING NIPPERS PART NUMBER 017008

- Micro-structured cutting edge suitable for cutting all Flat-Flex belting including 4mm wire diameter.
- Gripping surface below the joint suitable for wire diameters from 1.0mm.
- Multi-component handles with integrated spring return and locking device. The compound lever design gives good mechanical advantage.
- Manufactured to DIN ISO 5743:2004.

FINE WIRE CUTTING PLIERS PART NUMBER 017004

- Suitable for use with high tensile music wire belts.
- Slim profile head for cutting tightly-pitched belts common to chocolate enrobing processes.
- Leverage reduces force expenditure by 40%.
- Spring return.
- Manufactured to DIN ISO 5747:1995.

SIDE CUTTING PLIERS PART NUMBER 017003

- The jaws remain parallel throughout their range of movement giving a positive grip.
- The jaws are knurled with a single longitudinal V-slot. Wire can be fed through the throat of the plier from either end and held firmly over the length of the jaws.
- Anti-rust finish with bright nickel plated handles and fully heat treated chemically blackened jaws and cutter.
- Position of cutter on the side of the plier ensures the tool can be used where access is limited.

MICRO SHEAR WIRE CUTTERS PART NUMBER 017006

- The self-sharpening design gives good mechanical advantage enabling wire to be cut with no loss of sharpness.
- Compact design with spring return, heat treated and chemically blackened.
- Suitable for wire diameters up to 1.27mm.

EZSPLICE MULTI-HEAD PROFILING PLIERS PART NUMBER 017009

- Individual heads for each pitch and wire combination within the EZSplice range
- Crimps joining strand to ensure a secure belt join with a flat carrying surface
- Prevents “over-crimping”

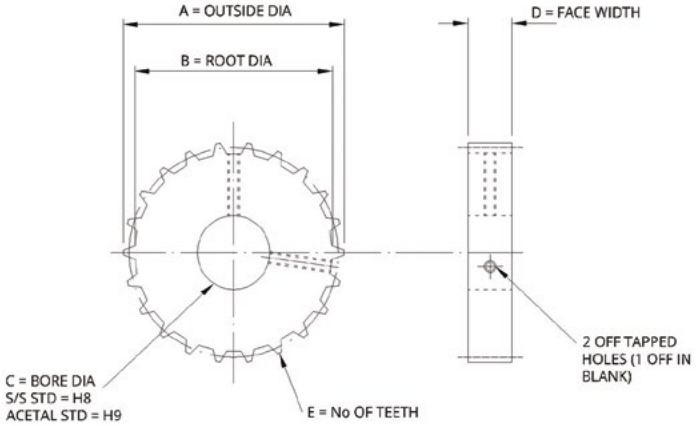
Flat-Flex® metric drive sprockets and blanks

To Suit Belt Specification		Part Number		Sprocket Details			
Pitch	Wire Diameter	Sprocket	Blank	Outside Dia. (A)	Root Dia. (B)	Bore Dia. (C)	Number of Teeth
4.24 mm 4.30 mm 4.30 mm	0.9 mm 1.00 mm 1.27 mm	05-1122 07-1112	06-1123 08-1113	50.80 mm	46.99 mm	20 mm	34
5.64 mm	0.9 mm 1.00 mm	05-2122 07-2112	06-2123 08-2113	50.80 mm	45.72 mm	20 mm	25
		05-2522 07-2512	06-2523 08-2513	76.20 mm	70.00 mm	20 mm	39
		05-2422 07-2412	06-2423 08-2413			25 mm	
6.35 mm	0.9 mm 1.00 mm 1.27 mm	05-3122 07-3112	06-3123 08-3113	50.80 mm	44.19 mm	20 mm	22
		05-3222 07-3212	06-2223 08-2213	76.20 mm	71.12 mm	20 mm	35
		05-3322 07-3312	06-2323 08-2313			25 mm	
6.4 mm	1.4 mm	05-9818 07-9818	06-9184 08-9819	50.80 mm	45.19 mm	25 mm	22
		05-8760 07-8760	06-8761 08-8761	74.85 mm	69.77 mm	25 mm	34
7.26 mm	1.27 mm 1.6 mm	05-4122 07-4112	06-4123 08-4113	31.75 mm	27.43 mm	16 mm	12
		05-4222 07-4212	06-2123 08-2113	50.80 mm	45.72 mm	20 mm	20
		05-4322 07-4312	06-4323 08-4313			25 mm	
		05-4422 07-4412	06-4423 08-4413	57.15 mm	50.80 mm	20 mm	22
		05-4522 07-4512	06-4523 08-4513	76.20 mm	68.58 mm	20 mm	29
		05-4622 07-4612	06-4623 08-4613			25 mm	
9.00 mm	1.83 mm	05-9242 07-9242	06-9367 08-9367	76.20 mm	69.28 mm	25 mm	24
9.6 mm	2.08 mm	05-9063 07-9063	06-9078 08-9078	74.88 mm	67.26 mm	25 mm	22
11.30 mm	1.27 mm	05-5122 07-5112	06-5123 08-5113	76.20 mm	70.86 mm	25 mm	19

12.70 mm	1.83 mm 2.35 mm	05-6122 07-6112	06-6123 08-6113	50.80 mm	44.95 mm	20 mm	11
		05-6222 07-6212	06-6223 08-6213			25 mm	
		05-6322 07-6312	06-6323 08-6313	76.20 mm	68.58 mm	20 mm	17
		05-6422 07-6412	06-6423 08-6413			25 mm	
20.32 mm	2.35 mm	05-7122 07-7112	06-7123 08-7113	76.20 mm	65.53 mm	20 mm	10
		05-7222 07-7212	06-7223 08-7213			25 mm	

Pre-fixed codes '05' & '06' are Stainless Steel, pre-fixed codes '07' & '08' are Polyoxymethylene (POM)
Standard Face Width ('D') is 14.3mm; other widths are available on request. Keyways are optional.

Standard Sprocket Dimensions



Manufacturing Tolerances:

Stainless Steel: BS 4500 1969H8
Polyoxymethylene: BS 4500 1969H9

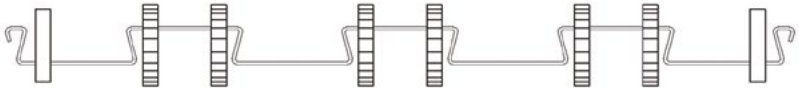
Sprockets are secured by two (2) socket head set screws at nominally 90°.
Blanks have a single fixing position only.

Sprocket arrangements

Sprockets are usually placed in the odd numbered spaces to allow use of splicing clips without interfering with sprockets. If clips are never used, placing sprockets in even numbered spaces ('Alternative' style) is acceptable. However you should never mix the two arrangements.

STANDARD

ALTERNATIVE



Calculating the Number of Sprockets

The number of sprockets required to drive your belt depends on the number of spaces across the belt. Here's how to calculate it:

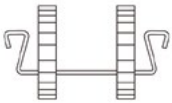
Belts with a single loop edge need one less sprocket than the number of belt spaces, plus two blanks.

Drive shafts for double loop edge belts should be set up 'Alternative' style.

Note: Two exceptions to the rules: A) a single space belt uses only two (2) sprockets; B) a three space belt requires four (4) drive sprockets and no blanks.

Three Space Belt Arrangement

Single Space Belt Arrangement



Drive component and support requirements for Flat-Flex® belts

Component quantity chart (Sprockets/Blanks/Support Strips/Joining Clips)

Based on Flat-Flex number of belt spaces across belt width.

No. of Spaces Across Belt	Drive Shaft		Idler Shaft		Belt Supports	How many Space Clips				
	Number of		Number of		Wear Strips	No. of Spaces	Single Clips	Set of Clips		
	Sprockets	Blanks	Sprockets	Blanks				Single	+	3-Space
1	2	0	2	0	2	1	-	-		-
3	4	0	2	2	2	3	2	0		1
5	4	2	2	4	3	5	3	1	+	1
7	6	2	2	6	4	7	4	0		2
9	8	2	2	8	5	9	5	1	+	2
11	10	2	2	10	6	11	6	0		3
13	12	2	2	12	7	13	7	1	+	3
15	14	2	4	12	8	15	8	0		4
17	16	2	4	14	9	17	9	1	+	4
19	18	2	4	16	10	19	10	0		5
21	20	2	4	18	11	21	11	1	+	5
23	22	2	4	20	12	23	12	0		6
25	24	2	4	22	13	25	13	1	+	6
27	26	2	4	24	14	27	14	0		7
29	28	2	4	26	15	29	15	1	+	7
31	30	2	4	28	16	31	16	0		8
33	32	2	4	30	17	33	17	1	+	8
35	34	2	4	32	18	35	18	0		9
37	36	2	6	32	19	37	19	1	+	9
39	38	2	6	34	20	39	20	0		10
41	40	2	6	36	21	41	21	1	+	10
43	42	2	6	38	22	43	22	0		11
45	44	2	6	40	23	45	23	1	+	11
47	46	2	6	42	24	47	24	0		12
49	48	2	6	44	25	49	25	1	+	12

12 potential causes of downtime related to conveyor belting

By their very nature, all conveyor belts have a finite life, including metal belts. However, it is a fact that the majority of conveyor belts do not wear out or "use up" their life. Most belts, if they actually do fail during use in a production environment, fail because of factors not related to strength, belt life, or robustness of the belt. They usually fail for one or more of the reasons outlined below. These failures result in critical downtime, which equates to lost opportunity, lost production and lost profits. We have listed 12 of the most common issues that have been found to be the culprit in conveyor and/or belting breakdown situations. They are listed in reverse order with number 12 being the least common, and number 1 being the most common.

1. No spare belt – A spare belt should always be available close to the point of use in order to be prepared for the unexpected. It is a false economy not to carry spare belting or to make arrangements for rapid availability. The Wire Belt Company has a number of solutions to the costly cause of downtime.

2. Installing the belt "backwards" – The single or double loop edges on the belt should curve back and away from the direction of belt travel. If the belt is installed back wards, the loops can catch (for example clothing) and cause accidents.

3. Belt installed and run "upside down" - There is a smooth ("top") side to Flat-Flex belts and an "underside" where the Z-bends form a distinct "ridge". The smooth side should always be "up" for the belt to run properly.

4. Using the wrong mesh belt for the current application - Products and processes change over the years. The conveyor and belt that were designed for a specific product and process several years ago may no longer be appropriate or heavy duty enough for the demands of the current application. The impact of product loading and belt speed on belt life needs to be re-evaluated on an on-going basis.

5. Drive sprockets out of alignment - The drive sprocket teeth must be perfectly aligned so that they all pull together smoothly to avoid "stress overload" on individual wire strands. (Using a "Keyed" drive shaft eliminates the need to manually align the sprocket teeth.)

6. Installing the wrong drive sprockets - Substituting other commercially available spur gears and sprockets will cause belt climbing and snapping. Only Flat-Flex sprockets purchased from Wire Belt Company are specifically designed to fit and pull the belt properly.

7. Transfer or reverse bend radii too small - This causes unnecessary stress in the Z-bends.

8. Worn out or damaged drive components - Worn drive sprockets, idler sprockets, or blanks, can cause a belt to skip, drift side to side or slip on a conveyor circuit. All of these conditions will cause either premature wear or induce work hardening in the individual wire strands leading to broken wires and downtime.

9. Improper clearance between belt joints (“Z-bends”) and drive sprockets, blanks, grooved end rollers and/or wear strip. The Z-bends should never make contact with any conveyor component. A minimum 5mm clearance is required. There also needs to be sufficient clearance between the Z-bends on the underside of the belt and the bottom of the grooves in the transfer rollers. The belt joints on the underside of the belt running over any portion of the wear strips will produce wear and fatigue failure.

   NOTE: Hygiene and maintenance teams should be properly trained to ensure that clearances are still in place after cleaning or servicing equipment.

10. Too much tension on the belt - Flat-Flex is a low-tension system. You only need to use enough tension to engage the drive sprockets correctly. (Too much tension literally pulls the belt apart).

11. Accidents to the conveyor machinery and belt - Accidents can and should be minimised, through establishment of standardised maintenance checklists and proper training of maintenance personnel.

12. Poor or incomplete joining - Getting the splice right is not only difficult but time consuming. Many splices are made in haste; often they’re put together “on-the-fly” immediately following a breakdown. The unfortunate result is that nearly 90% of break ages during production occur at the splice.

Trouble shooting guide

Problem	Possible Cause(s)	Solution(s)
Joining clips breaking	• Alternative style sprocket arrangement used (sprockets in even spaces)	• Adjust to standard style arrangement (sprockets in odd spaces)
	• Belt improperly joined	• Reinstall following joining instructions
	• Clips and/or strands not straightened after joining	• Straighten any bent clips or strands using pliers
	• Sprockets not properly installed or aligned	• Check sprocket alignment and adjust if needed
	• Uneven tension	• Adjust tension so it is equal on both sides of frame
Belt surges	• Belt not supported on frame	• Install supports on return path
	• Load too high	• Change to heavier mesh belt
	• Uneven product loading	• Correct loading method
	• Wrong type of wear strips	• Change to different type / material / design wear strip
Excessive wear strip wear	• Abrasive cleaner used	• Install spray wash on belt to reduce grit build up
	• Load too high	• Change to heavier mesh belt
	• Not enough wear strips	• Install more wear strips
	• Wrong type of wear strips	• Change to different type / material / design wear strip
Damage to flights	• Product jamming on loader	• Check hopper/chute infeed sides and correct jamming
	• Flights getting caught on frame support	• Check for obstructions on frame and correct
	• Flights rubbing on return path	• Allow sufficient clearance with frame; indent flights
Belt edges curling up	• High temperature	• Use crowned belts (a specialty belt); Call Technical Sales for information and pricing
	• Too much tension	• Adjust tension take-up
	• Belt joints unsupported	• Adjust sprockets/blanks/rollers to within 5mm of Z-bends
	• Load too high	• Change to heavier mesh belt

Trouble shooting guide

Problem	Possible Cause(s)	Solution(s)
Belt no tracking property	• Sprocket teeth mis-aligned	• Check alignment and adjust
	• Conveyor frame not square	• Realign conveyor frame
	• Support rolls not squarely aligned	• Realign support rolls
	• Drive shaft not aligned	• Realign following alignment instructions
	• Uneven product loading	• Correct loading method
	• Belt improperly joined	• Reinstall following joining instructions
	• Belt is “wrong side up”	• Reinstall belt with smooth side up
Belt runs to one side	• Sprocket teeth mis-aligned	• Check alignment and adjust
	• Conveyor frame not square	• Realign conveyor frame
	• Support rolls not squarely aligned	• Realign support rolls
	• Transfer roll not functioning properly	• Change to grooved end roll
	• Drive shaft not aligned	• Realign following alignment instructions
	• Uneven product loading	• Correct loading method
	• Uneven tension	• Adjust tension so it’s equal on both sides of frame
	• Belt improperly joined	• Reinstall following joining instructions
Belt wears edges	• Not enough clearance	• Adjust clearance between belt edge and on side rail
	• Conveyor frame not square	• Realign conveyor frame
	• Shafts not locked down	• Use collars on outside of bearings to prevent lateral shifting
	• Sprocket teeth mis-aligned	• Check alignment and adjust
	• Belt expansion from high temperature	• Adjust clearance between belt edge and side rail to allow for heat expansion
Belt slips on sprockets	• Insufficient tension	• Adjust tension take-up
	• Sprockets not properly installed or aligned	• Check sprocket alignment; adjust if needed
	• Worn sprockets	• Replace sprocket
	• Drive sprockets too small	• Replace with larger diameter sprockets from Wire Belt, or increase wrap
	• Insufficient belt wrap	• Increase wrap around drive sprockets up to between 120° to 180°

Trouble shooting guide

Problem	Possible Cause(s)	Solution(s)
Belt blackening	• Frozen/stuck roller	• Free roller; reduce or eliminate steel-to-steel contact
	• Too much tension	• Adjust tension take-up
	• Load too high	• Change to heavier mesh belt
	• Improper/inadequate cleaning	• Install continuous spray cleaning device on conveyor
	• Too much metal to metal contact	• Replace metal parts, where possible, with suitable plastic alternatives
Excessive belt wear or poor belt life	• Contact with other equipment	• Eliminate contact
	• Support rolls not rotating	• Check bearing and replace if needed
	• Too much tension	• Adjust tension take-up
	• Uneven tension	• Adjust tension so it is equal on both sides of frame
	• End roll/reverse bend too small	• Check for correct minimum diameter
	• Wrong type of wear strip	• Change to a different type/material/ design/wear strip
	• Abrasive cleaner used	• Install spray wash on belt to reduce grit build up
	• Load too high	• Change to a heavier specification belt
	• Speed too high	• Reduce running speed
	• Belt improperly joined	• Reinstall following joining instructions
	• Frame not level	• Correct affected area
	• Sprockets not properly installed or aligned	• Check for correct sprocket arrangement and alignment - adjust if needed.
Excessive sprocket wear	• Too much tension	• Adjust tension take-up
	• Abrasive cleaner used	• Install spray wash on belt to reduce grit build-up
	• Sprocket teeth mis-aligned	• Check alignment and adjust
	• Not enough drive sprockets	• Add more sprockets
	• Sprockets not properly installed or aligned	• Check sprocket alignment and adjust if needed
	• Load too high	• Change to heavier mesh belt
	• Belt speeds too high	• Reduce speed
	• Shaft(s) bent	• Check shafts and replace if needed
Belt jumps on sprockets	• Worn sprockets	• Replace using Wire Belt sprockets
	• Wrong size sprockets	• Replace with correct sprocket of correct dimensions for pitch and wire
	• Belt is “wrong side up”	• Reinstall belt with smooth side up
	• Product build-up between belt and sprockets	• Install wiper on return belt to prevent product getting trapped; install side guards on frame
	• Too much tension	• Adjust tension take-up
	• Incorrect drive shaft layout	• Reposition sprockets
	• Sprocket teeth mis-aligned	• Realign sprocket teeth using a straight edge
	• Incorrect sprocket pitch versus belt pitch	• Replace by matching sprockets from Wire Belt Co.

Causes and prevention of black residue build-up on belting

Several causes of black residue build-up on Flat-Flex have been identified and we recommend the following approaches to either reduce and/or eliminate this residue.

IDENTIFIED CAUSES

Wear
Black residue is the result of belt wear from the rubbing action between the belt joints, belt supports, sprockets, and other conveyor components. Major contributors to belt wear are excessive tension and/or speed. There should only be sufficient tension applied to keep the belt smoothly engaged on the drive sprockets.

Cleaning Products
Failure to thoroughly wash and clean belts after use can be a cause of black residue. Caustic cleaners can also leave a residue, which causes a blackening effect on the belt if not thoroughly rinsed off. Lab studies of many cases show virtually all components of black residue to be food ingredients, chlorine or other cleaning chemicals, and some stainless steel. Chlorine is corrosive to stainless steel, which may accelerate wear rate if not rinsed thoroughly.

Fats and Salts
When rubbed between metal surfaces, fats and salt from meat and poultry products can blacken and migrate along the belt strands.

Non-rotating Grooved End Rolls and Solid Nose Bars without Grooves
The high tensile strength stainless steel wire used in Flat-Flex belting is harder than most bar stock materials and will wear slots in the non-rotating groove end rolls and solid nose bars without grooves. This worn material will transfer to both the belt and product, as well as reduce belt life.

Poor Quality Wear Strips
Roughly finished wear strips are abrasive and will transfer black residue to the belt. Wire Belt Company recommends that all metal support strips be made from round stock. Roughly finished plastic support strips will 'hold' the black residue as it forms and becomes embedded in the porous or sawn plastic strips, thereby increasing belt wear by acting as an abrasive.

Friction
As noted previously, some of the black residue formed is from normal belt wear of type 1.4310 (302) stainless steel metal strands rubbing against each other. This is the most noticeable when the belt is new and 'breaking in', however, this is significantly reduced after a few days of operation.

PREVENTION OF BLACK RESIDUE

Reducing Belt Speed and/or Loading
Minimising conveyor belt speeds reduces wear and interaction of food products with the belt as well as the conveyor components. In many instances, this solution can completely eliminate the problem because the slower the speed, the less tension needs to be applied to the belt.

Reducing Friction in the Belt Circuit
If stainless steel snub rolls, grooved end rolls, and tracking rolls must be used due to process requirements, all rolls should be made as large as possible and be able to rotate freely to reduce friction in the belt circuit.

Large diameter sprockets pull the belt more evenly with smoother hinging action, reducing rubbing of the belt mesh at its hinge points and the sprocket teeth, thus reducing the friction wear.

Improve Natural Lubrication of Conveyor Components
When the processes are dry, such as conveying frozen or baked products, and natural lubrication of the conveyor components from the product or process is minimal, Wire Belt Company recommends plastic drive sprockets, end rolls, and belt support strips. Both Delrin® (or equivalent), or UHMW polyethylene plastics provide smooth and relatively strong alternatives to steel components and are reliable from 0° to 82°C. Round or oval extruded UHMW support strips are most suited to keep blackening to a minimum.

In many processes, the belt is subjected to natural lubrication from cooking oil, the product itself, or other process coatings. This form of lubrication helps reduce friction from occurring on the belt, wear strips, and drive components to a point that any blackening problem is eliminated or unobjectionable.

Creating Awareness of Rinsing Requirements
Sanitation crews should be made aware that all belts, sprockets, end rolls, nose bars and support strips must be thoroughly rinsed of all product residue and cleaning products.

Continuous Cleaning Systems
Many conveyor systems use clean-in-place, wash and brush systems to continuously keep the belt free of any type of product or residue build-up on the belt.

Correct Belt Selection
Flat-Flex belts are available in a variety of mesh sizes and wire diameters. Selection of the correct mesh and wire size is important with respect to the application's belt speed, length of the conveyor, size, weight and distribution of the load. Always select the largest mesh size and wire diameter available consistent with the application. Wire Belt Company's Technical Sales department will provide help in belt and sprocket selection. With proper belt selection, a sound conveyor design and careful maintenance, a conveying system can be assured to be virtually free of an accumulation of black residue attributed to the belt.

OTHER NOTES

Technical Support
If you require further information regarding black residue or metal belting in general, please call our Technical Sales Engineers on +44 (0) 1795 421771 or e-mail sales@wirebelt.co.uk.

Wire Belt Company offers personal field and technical assistance to all Flat-Flex wire belt users.

A Note about Flat-Flex Belts
Flat-Flex belts are made of the finest quality, high tensile strength, highly polished type 1.4310 (302) stainless steel. To date, Wire Belt Company has found no better material which balances belt life, formability, blackening, and cost than type 1.4310 (302) stainless steel.

The belt's open construction and unique hinging design provides for the most easily cleaned open mesh available. Since 1973 the US Department of Agriculture fully accepted Flat-Flex for use in federally inspected meat and poultry plants.

For over 85 years, Flat-Flex has been successfully used in food plants around the world.

Glossary of terms

Aligned belt	A Flat-Flex belt, which has had shapes, formed in each strand of the belt forming distinct rows in which a product can rest.
Belt supports	(or carry ways) These may also be referred to as wear strips and provide belt support on either product carrying side or return side or both. Depending on the material used, they can greatly influence the tension in the belt.
Belt Width	The overall width of the belt across the strand, measuring from the outermost point of each edge lug
Blank	A support disk, similar to a sprocket with no teeth.
Bottom belt	The product-carrying belt in a dual belt system, such as in a fryer. See “hold down” to describe top belt.
Carry way	See “Belt support”
Catenary sag	A belt hanging under its own weight between two (2) supports in the curved shape. This is our preferred gravity take up.
Clean Sweep	A sprocket form exclusively supplied by Wire Belt, which prevents accumulation of debris between sprocket teeth.
Cleat	See flight
Compound belt	A Flat-Flex belt made with one or more special strands with “flights” formed into a repeating pattern.
Counter weight	(or gravity weight) take up. A weighted roll within the belt circuit, which is used to tension the belt at a constant, level.
Crown	Flat-Flex belt, pre-stressed in a positive camber across the belt width, so when heat is applied, the belt will remain flat.
Discharge end	Unloading end of the conveyor.
DLE	Abbreviation for double loop edge. Reinforces the outside edge of the belt. Available with finer wires only. For single loop end, see SLE.
Edge Lug	The form at the end of each strand, available in single loop edge, double loop edge and C-Cure Edge™
End roll	The shaft at either end of a conveyor, but not a drive roll.
Endless	A belt supplied pre-joined to a set circuit length
Enrober	A machine used to coat products, most commonly referring to a chocolate enrober.
Enrober belting	Flat-Flex Type belting, as used on enrobers.

Flat-Aligned	A Flat-Flex belt with a horizontal formation in every space. Commonly used in meatball forming applications.
Flight	A shape pre-formed into the Flat-Flex strand that typically sticks out above the mesh. Usually used to help push a product up an incline. See compound belt.
Gear	See sprocket.
Gravity weight	See counter weight.
Hold down belt	Also called “submerger belt” or “top belt”. Used in a dual belt system, this belt is used as means to hold product under a liquid such as in a fryer.
Idle roll	A non-driven shaft in the conveyor circuit. Often referred to as the infeed roll or discharge end roll, end roll, or a support roll.
Idler rollers	Steel or plastic pipes which spin freely on an end roll. Prevents damage to the “joints”. Commonly used as supports for belt return.
Infeed drive	Belt is being driven or pushed from the loading end of the conveyor.
Infeed end	The loading end of the conveyor.
Joint	The bend in the wire, which in relation with another, defines a “space”. Looks like a “Z” on Flat-Flex. Point where the belt hinges. Same as Z bend.
Mesh	Used to describe the weave/layout of a belts surface.
Metal fatigue	A condition where metals fracture after a period of cyclic loading.
Music Wire	A high-tensile, high-carbon steel wire, so-called for its use in piano strings.
PEEK	Poly Ether Ether Ketone.
Pitch	The dimension from the centre of one wire (or chain link) to the centre of the next along the length of the conveyor
Polyacetal	Strong, thermoplastic with low coefficient of friction. Temperature range -40°C to 65°C. Good balance of mechanical and chemical properties.
Reverse bend	Same as reverse roll, or reverse shaft. The path Flat-Flex belt takes when it is flexed in the opposite direction from a normal transfer. Typically, this is a shaft used to increase the wrap around a drive or to assist the belt’s change of direction.
Reverse crown	A Flat-Flex, pre-stressed with a negative camber across the width of the belt, usually done on a “hold down” belt.

SLE	Single loop edge. This is the standard Flat-Flex edge configuration.
Space (Space Width)	The distance between the centre of two adjacent belt joints or Z-bends in Flat- Flex belts.
Splicing	Connecting the leading end of the belt to the trailing end of the belt, creating an endless loop.
Sprocket	A machined part with any number of teeth, as on the rim of a wheel, arranged to fit and engage Flat-Flex belts. They are specifically made to fit on a shaft that together with the sprocket positively drives the belt.
Stainless Steel	A steel alloy with improved resistance to corrosion due to the inclusion of chromium.
Strand	A formed section of wire that is interwoven with identical strands to form a Flat-Flex® belt.
Submerger belt	See “hold down belt”
Supports	See “belt supports”.
Tensile	A measurement of the “pull” strength (to failure) of a material.
Tension	A measure of “pull” in a system.
Transfer rollers	Spool shaped rollers that turn freely on a shaft where Flat-Flex joints run in the groove.
UHMW - PE	Ultra High Molecular Weight Polyethylene. This is a high-density polyethylene resin used in the manufacture of wear strips with excellent wear characteristics.
USDA	United States Department of Agriculture. Federal agency that regulates equipment that may be employed in meat, dairy and poultry processing.
Wear strips	Plastic or metal strips that the belt rides on to increase the useful life of the frame and prevent wear to the conveyor belting.
Wire	Metal drawn into a very long thread or rod, usually circular in cross section.
Wire Diameter	A measurement over the cross-section of the wire, from edge to edge.
Wrap	The amount of belt in contact with the drive sprocket; normally 180°, but could range between 120 to 220°.
Z bend	The bend in the wire, which in relation with another, defines a “space”. Looks like a “Z”. Point where the belt hinges. (Same as joint)

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Our policy is one of continuous improvement and we reserve the right to change specifications at any time and without notice, or modify these to suit manufacturing processes

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