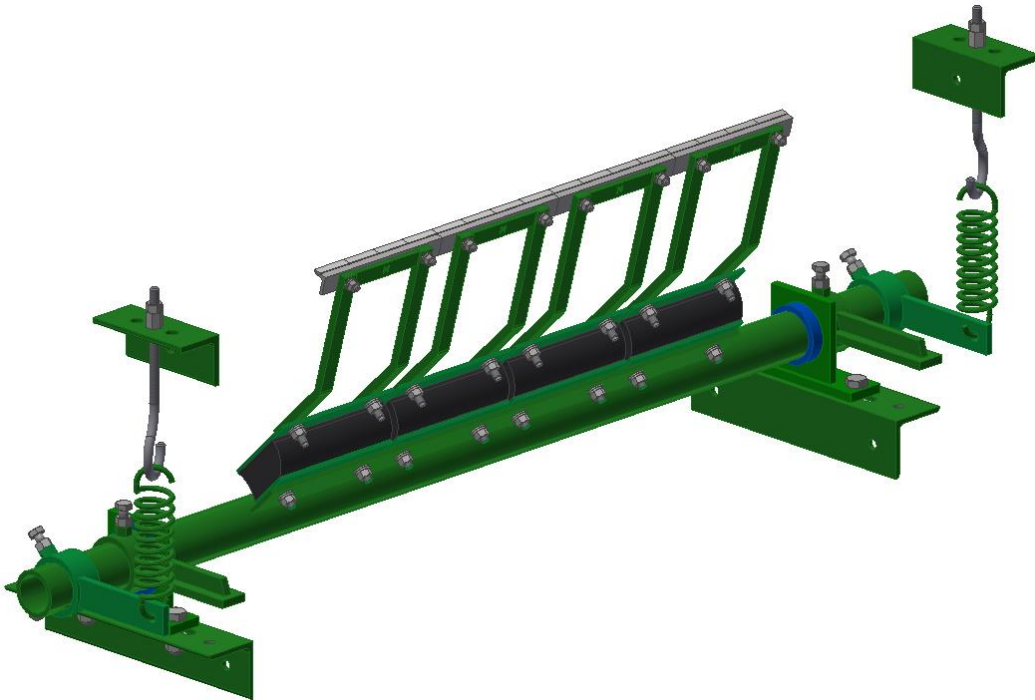


Installation, Operation and Maintenance Manual



H Belt Cleaner with Spring Tensioner

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1 General Information

1.1 Overview

The Belle Banne H Belt Cleaner is designed to be positioned on a head or tripper pulley. It is typically referred to as a “primary” cleaner, as it is the first cleaner after the material discharge point. The cleaner comprises a set of mounting brackets, a pole, and a series of “blades”, each comprising a rubber cushion, an arm and a tip. The blades are 200mm wide. The arms come in a range of sizes to suit different pulley diameters.

Torsion is applied to the pole via a torque arm or a spring tensioner. Tension is then stored in the rubber cushions and is applied to the tip which is in contact with the conveyor belt surface. For belt widths up to 1200mm the pole is 60mm diameter. For belt widths greater than 1200mm the pole is 73mm diameter and is braced with a section of equal angle.

H Belt Cleaners are able to handle reversing belt applications.

For more challenging applications, Heavy Duty H Belt Cleaners are available.

1.2 Advantages

Belt cleaners significantly reduce the amount of material build-up on the conveyor belt, known as carryback, which can cause:

- material spillage,
- belt tracking problems,
- build up on return idlers,

These issues contribute to unwanted plant downtime, resulting in increased costs.

Installation of appropriate belt cleaning systems (one or more belt cleaners) will minimise these issues.

1.3 Safety

During installation and maintenance of all belt cleaners, ensure all energy sources are isolated in accordance with the relevant site’s procedures.

Ensure all works are conducted by qualified or competent personnel.

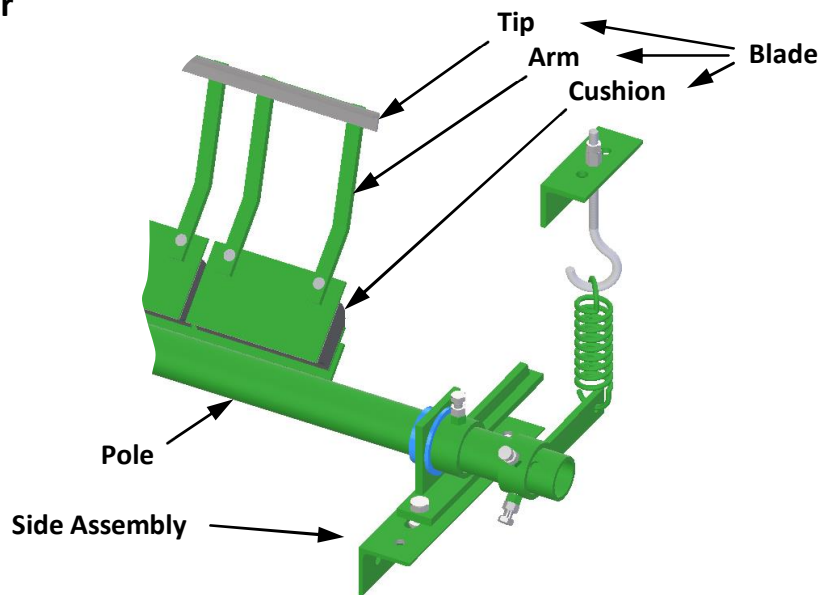
Ensure all personnel utilise appropriate personal protective equipment as required.

1.4 Assistance

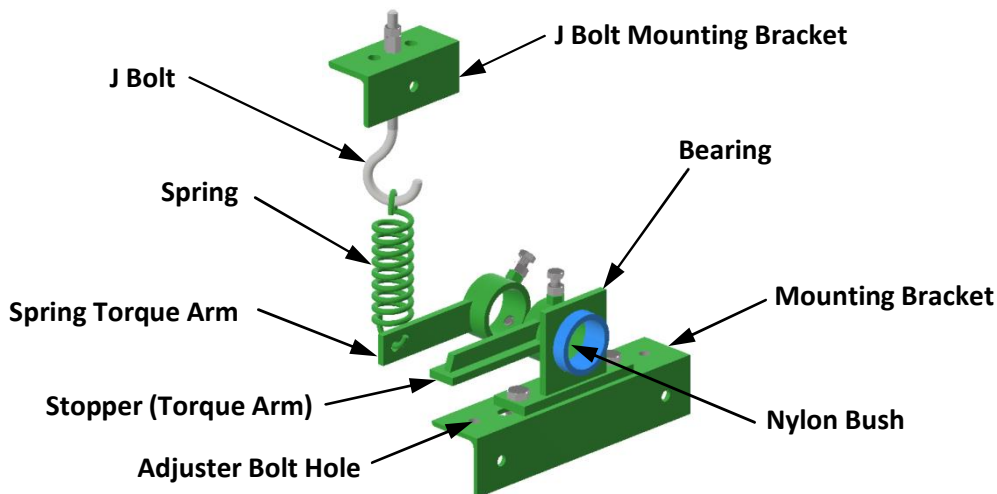
If assistance is required through any stage of the process: belt cleaner selection, design, drafting, installation and/or maintenance, Belle Banne Conveyor Products have personnel that able to provide support.

2 Belt Cleaner Components

2.1 Entire Cleaner



2.2 Side Assembly



2.3 Arm Sizes

There are five different arm sizes to suit the range of pulley diameters up to 1700mm. Use the adjacent table to select the appropriate arm size for the application. If necessary, a larger arm size can be used for a smaller pulley, but a smaller arm cannot be used on a larger pulley.

Pulley + Lagging + Belt	Arm Size
Up to $\varnothing 500\text{mm}$	SS
$\varnothing 500\text{mm} - \varnothing 800\text{mm}$	S
$\varnothing 800\text{mm} - \varnothing 1000\text{mm}$	M
$\varnothing 1000\text{mm} - \varnothing 1200\text{mm}$	L
$\varnothing 1200\text{mm} - \varnothing 1700\text{mm}$	LL

For pulley diameters greater than 1700mm, contact Belle Banne Conveyor Services for technical assistance.

3 Tools & Equipment

3.1 Installation

The tools and equipment required to install an H Belt Cleaner are:

- Measuring equipment – for marking out pole location, mounting bracket position, and holes in the chute walls (if required).
- Marking pen or chalk.
- Cutting equipment – for cutting holes in the chute walls (if required).
- Drilling equipment – for drilling holes for the mounting brackets (unless they are being welded to the chute wall or structure).
- Welding equipment – for welding the mounting brackets to the chute walls or structure (unless bolted connections are being used).
- Mechanical lifting aids – for lifting larger (heavier) belt cleaners into position.
- 2 & 19mm & 2 x 24mm sockets or spanners – for tightening side assembly fasteners.
- H Belt Cleaner template – for confirming correct tip alignment.
- Scales – for measuring tip tension.
- Anti-seize – recommended for coating on fasteners prior to installation.
- DENSO tape – recommended for covering exposed thread on the mounting bracket fasteners.

3.2 Maintenance

The tools and equipment required to maintain an existing H Belt Cleaner are:

- Paint scraper / wire brush – for cleaning away material build-up.
- 19mm & 24mm spanners – for side assembly fasteners.
- 17mm socket or spanner – for cushion and arm nuts.
- 13mm socket or spanner – for tip nuts.
- Shims – for shimming cushions or arms to equalise tip tension.
- H Belt Cleaner template – for confirming correct tip alignment.
- Anti-seize – recommended for coating on fasteners prior to installation.
- DENSO tape – recommended for covering exposed thread on the mounting bracket fasteners.

Note: the above tools & equipment are the recommended minimum. Additional tools (adjustable wrench, screw driver, etc.) may also be required.

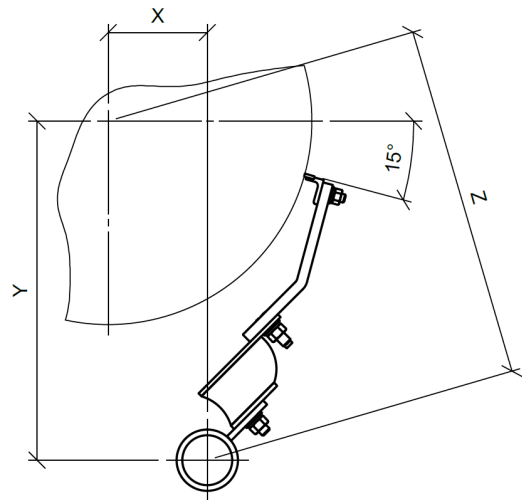
4 Mounting Location and Chute Modifications

4.1 Pole Position

The recommended H Belt Cleaner position is for the tip to be 15 degrees below horizontal. This enables:

- the tip to be out of the material flow during belt start up and stopping,
- the scraped material to return to the main material flow,
- the inside of the cushion to maintain a steep angle to reduce the risk of material build-up.

If circumstances make it difficult or impossible to achieve the recommended tip location, the entire belt cleaner can be moved higher or lower, by rotating it around the pulley centreline. However if it is moved too high the tips may enter the material flow. If positioned too low other problems including material build-up on the back of the cushions, and reduced adjustment range in the side assemblies can occur. Contact Belle Banne Conveyor Products for assistance in this regard.



The following tables provide details of the pole location for an H Belt Cleaner, for a range of pulley diameters and arm sizes, based on the recommended tip position of 15 degrees below horizontal.

60mm Pole Diameter				
Arm	Pulley	X	Y	Z
SS	Ø250	35	301	303
SS	Ø300	59	308	313
SS	Ø400	107	321	338
SS	Ø500	156	333	368
S	Ø500	131	386	408
S	Ø600	179	399	438
S	Ø700	228	412	471
S	Ø800	425	507	272
M	Ø700	212	459	506
M	Ø800	261	472	539
M	Ø900	309	485	575
M	Ø1000	359	498	613
L	Ø1000	333	523	620
L	Ø1100	381	536	657
L	Ø1200	429	549	697
LL	Ø1200	423	661	785
LL	Ø1400	519	687	861
LL	Ø1600	616	713	942
LL	Ø1700	664	726	984

73mm Pole Diameter				
Arm	Pulley	X	Y	Z
SS	Ø250	30	306	307
SS	Ø300	55	312	317
SS	Ø400	103	325	341
SS	Ø500	151	338	370
S	Ø500	127	391	411
S	Ø600	175	404	440
S	Ø700	223	417	473
S	Ø800	272	429	508
M	Ø700	208	464	508
M	Ø800	256	476	541
M	Ø900	305	489	576
M	Ø1000	353	502	614
L	Ø1000	328	527	621
L	Ø1100	376	540	658
L	Ø1200	425	553	697
LL	Ø1200	419	666	787
LL	Ø1400	515	692	863
LL	Ø1600	612	718	943
LL	Ø1700	660	731	985

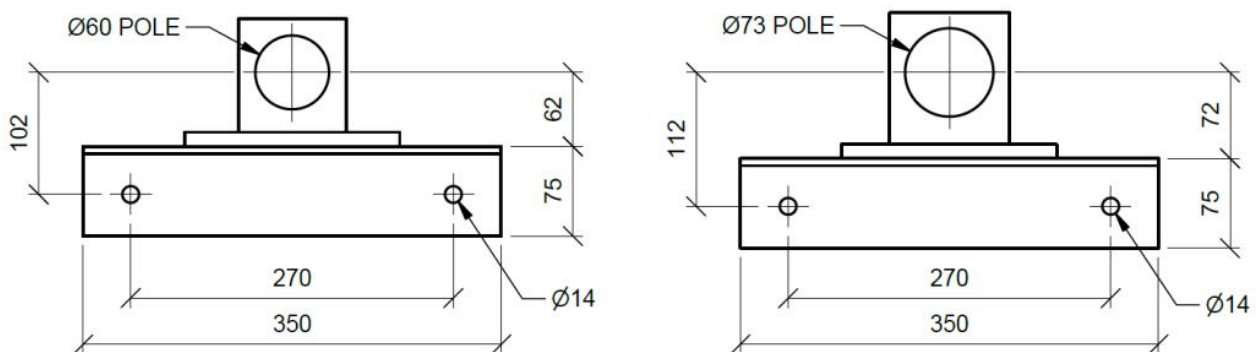
Refer also to www.bbc.com.au for an X & Y Calculator.

4.2 Mounting Bracket Position

The recommended orientation for the mounting brackets is horizontal. In circumstances where the bracket cannot be mounted horizontally, it can be mounted vertically, or at any angle between horizontal and vertical. However, when the bracket is vertical, the following issues occur:

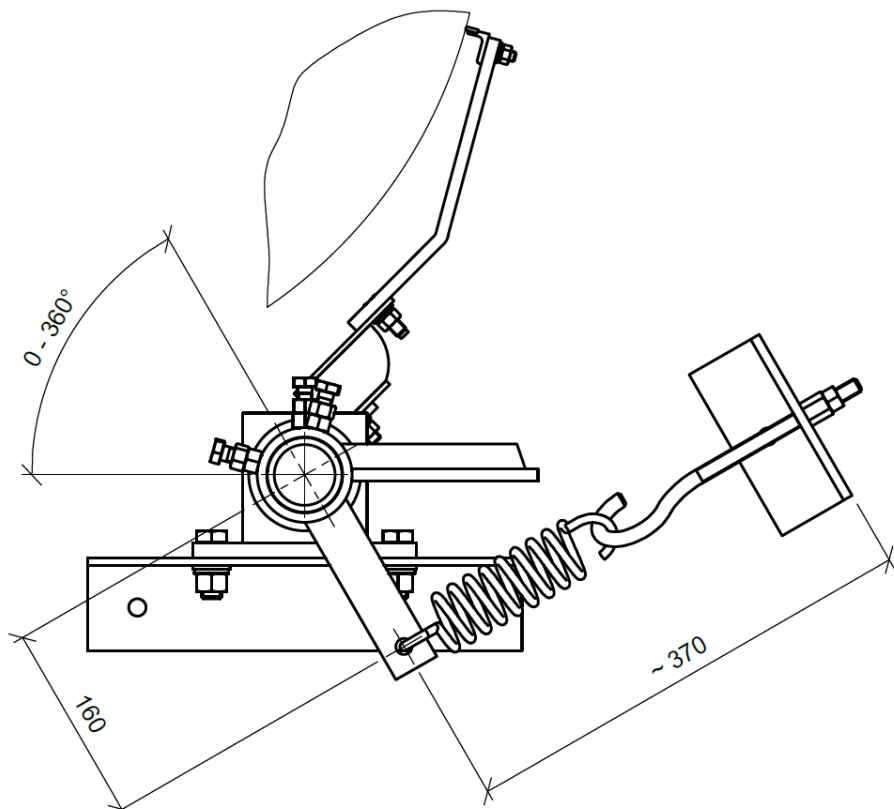
- The weight of the pole and blades is supported by the bearing bolts only.
- The slots in the mounting bracket, used to fine tune the tip position, become ineffective.
- Fine tuning the pole position is difficult because the bearing will naturally sit at the bottom of the mounting bracket slots.

The diagrams below show the mounting brackets positions in relation to the pole diameter.



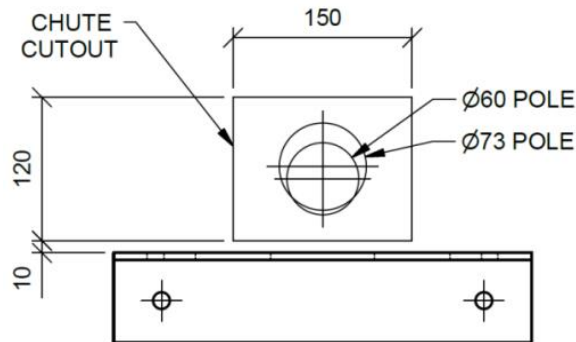
4.3 J Bolt Mounting Bracket Position

The spring torque arm can be positioned at any position 360° around the pole. The only requirement is that the bracket is perpendicular to the spring and J Bolt centreline. The adjacent diagram provides the main dimensions of the torque arm / spring / J bolt / J bolt mounting bracket assembly for reference.



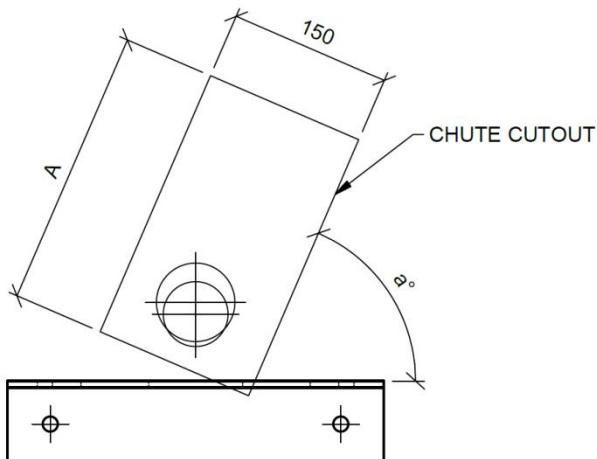
4.4 Chute Wall Modification

If the belt cleaner can be installed from the top or bottom of the chute, the holes in the chute wall will only need to be large enough to fit the pole through, with allowance for some adjustment. The diagram below shows the size of the hole and its relationship with the mounting bracket.



If the belt cleaner needs to be installed through the side of a chute wall, a hole must be cut into the chute wall to allow the belt cleaner to pass through.

The size and orientation of the hole depends on the arm size and the chute wall. The diagram and table below provides dimensions for the rectangular hole that will enable the entire pole/blade assembly to pass through the chute. The angle α° can range from zero degrees up to 90° . Refer to the table to determine the height of the hole, dimension A, in relation to the arm size.



Arm	A
SS	325mm
S	375mm
M	420mm
L	450mm
LL	555mm

5 Installation

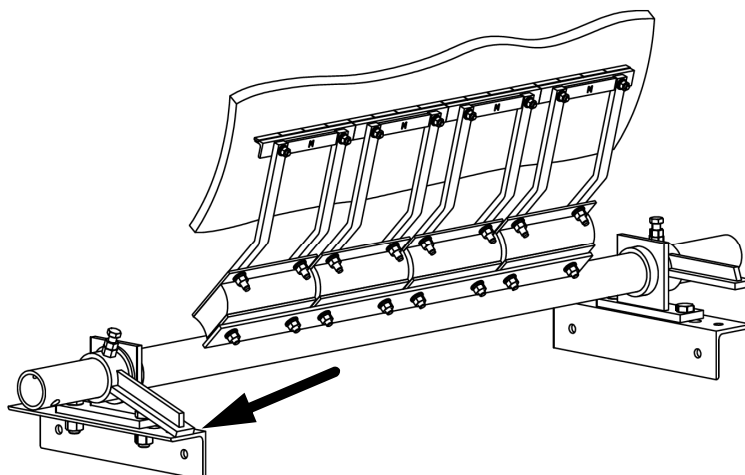
5.1 Installing the Pole/Blade assembly

The following steps are required to install an H Belt Cleaner with spring tensioner correctly. They are based on the mounting brackets already being installed.

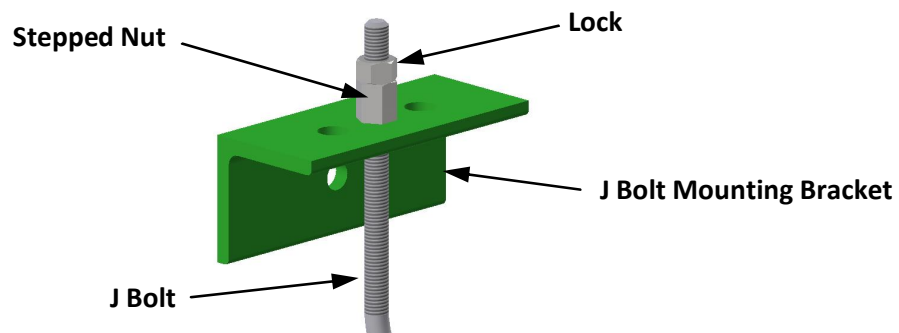
1. Ensure the mounting brackets are securely fastened to the chute wall or suitable structure by either welded or bolted connection.
2. Position the belt cleaner so each end of the pole is resting on the mounting brackets or the holes in the chute wall, and the belt cleaner is hanging upside down (ensure the belt cleaner is oriented correctly). This can be done by:
 - a. sliding the belt cleaner through a hole in the chute wall, or
 - b. lowering the belt cleaner down into the chute, one end first, then feeding that end through one hole in the chute wall, then sliding the other end through the other hole. Note: this may not be possible if the pole is too long. The ends of the pole can be trimmed if required. Ensure the trimmed pole length is such that there is enough pole protruding beyond the chute wall to pass through the mounting bracket and the spring torque arm, and allow enough pole to grip by hand, or with pipe-grips – say at least 150mm each side.

Note: whichever method is used, make sure the tungsten tips are protected – they are brittle and will chip easily.

3. Install the two bearings by sliding them onto the pole and sitting them on the mounting brackets then loosely tighten the mounting bolts after they have been coated with anti-seize.
4. Install a nylon bush onto the pole and into each bearing.
5. Position the belt cleaner so it is central on the pulley (the belt may not be tracked centrally).
6. Locate the two stoppers so they are snug up against the bearing plate and coat the locking bolts with anti-seize – do not tighten the bolts at this stage. (Note: the stoppers are torque arms when combined with the adjuster bolt on the mounting brackets.)
7. Using your hands or a pipe-grip, or by inserting a screwdriver through one of the holes in the end of the pole, rotate the pole/blade assembly upward so the tips touch the belt.
8. Tighten the locking bolt on one of the stoppers so the tips are touching, or close to the belt and the stopper arm is resting on the mounting bracket as shown by the arrow in the diagram below.



9. Coat the spring torque arm lock bolts with anti-seize then install one on each end of the pole so the centre of the plate lines up with the hole in the J bolt mounting bracket.
10. Rotate the torque arm so it is perpendicular to the J bolt mounting bracket then tighten the lock bolts and lock nuts.
11. Install the other spring torque arm so it aligns with the first spring torque arm and tighten the lock bolts and lock nuts.
12. Connect a spring to each torque arm, and a J bolt to each spring, and feed the J bolt thread through one of the holes in the J bolt mounting bracket. Select the hole that provides the most perpendicular alignment between the J bolt and the torque arm, remembering that the angle may change slightly when tension is applied.
13. Install a stepped nut on each J bolt, and a lock nut on the top of each stepped nut, as shown in the diagram below. At this stage the lock nut does not need to be tight.

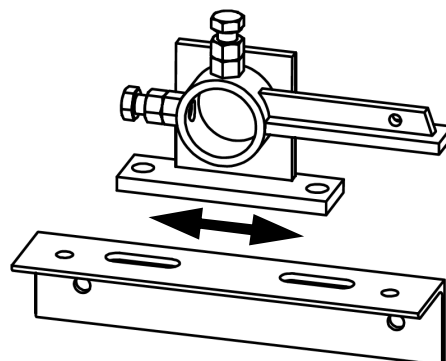


14. Take up tension on one of the J bolts to the tips just contact the belt.
15. Loosen the lock bolt on the stopper that you tightened in Step 8 and check that both stoppers are still flush with the bearings, then lock both in place in a horizontal position, by tightening both lock bolts and lock nuts so they are snug tight.
16. Now that the belt cleaner is loosely installed, the final set up can be done.

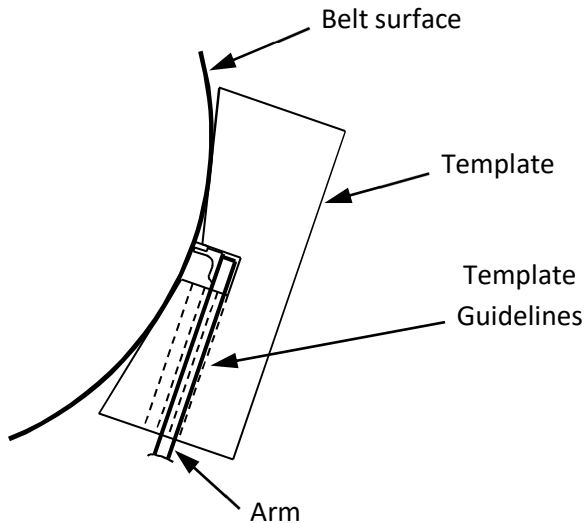
5.2 Set Up

1. Adjust the position of the pole so:
 - a. the tip angle in relation to the belt is 90° (see below),
 - b. the tips are providing even contact across the belt (see below),
 - c. the pole is horizontally parallel to the pulley centreline,

The position of the pole is adjusted by sliding the bearing within the range in the slots in the mounting brackets, as shown in the diagram below.



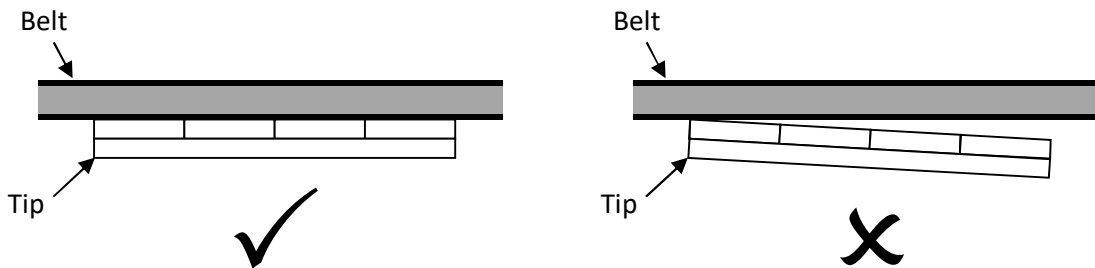
The tip angle in relation to the belt is determined by using the H Belt Cleaner template:



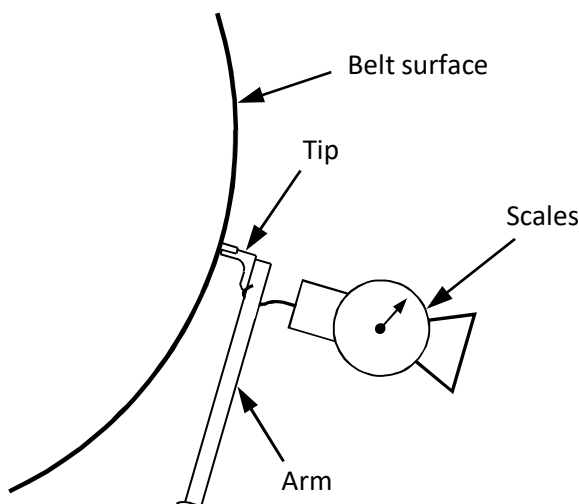
The tip angle in relation to the belt should be 90° and can be checked using the template as shown. If the arm is not parallel with the guidelines on the template, then the belt cleaner pole is either too close or too far from the pulley, and should be adjusted until the arms are parallel with the guidelines.

Evenness of tip contact on the belt:

Each tip should provide even contact to the belt surface, as shown in the following diagrams. If the belt surface is worn the tips may not sit evenly and may need to be shimmed (see Section 7.5).



2. Once the pole is positioned correctly (90° tip alignment, even tip-to-belt contact, pole is horizontally parallel with pulley), tightly fasten both sets of bearing mounting bolts.
3. Gradually tighten both J bolts, which will apply tip tension on the belt, regularly checking the tip tension using the method shown below.



The measurement is taken at the point the tip begins to lift away from the belt. Note that the exact position of the scales hook is not critical; as long as it is as close to the tip as practical and the same position is used each time measurements are taken.

Recommended tip tension for a standard H Belt Cleaner is 8-12kg per tip. Note that it is acceptable for the tip tension on the edge blades to be below this range when the edge of the belt is not as dirty as the centre section. For heavier duty applications (sticky material, high belt speeds, etc.), higher tip tensions can be achieved with a Heavy Duty H Belt Cleaner. Contact Belle Banne Conveyor Products for more information.

4. Where any tips fall outside the acceptable range, the blades should be shimmed to bring them within range (see Section 7.5 below).
5. Tighten the J bolt lock nut and wrap all bolts and nuts with Denso tape.
6. Double check that all nuts and bolts are tight, and wrapped in Denso tape.
7. The H Belt Cleaner is now ready for operation.
8. Test run the conveyor and observe the belt cleaner for at least 10 minutes, running both empty and conveying material. If the blades vibrate, slightly increase or decrease tip tension. Note: this will be a trial and error process that can be influenced by numerous factors.

6 Operation

Once the belt cleaner has been installed and set up correctly, the only operational activities required are regular inspections. The frequency of inspections will depend upon a number of factors including the conveyor duty cycle and the material type. During conveyor operation only a Visual Inspection (looking) can be done. When the conveyor is isolated a Physical Inspection (touching) can be done – refer to Section 7.

6.1 Visual Inspections

Visual Inspections can be done while the conveyor is operating. The following steps are recommended to perform a Visual Inspection on an H Belt Cleaner.

1. Wash away any material build-up on the tips, arms, cushions or pole.
2. Check for correct installation (see Section 5).
3. Check tip condition (see Section 7.2).
4. Estimate and record tip wear (see Section 7.3).
5. Check for any damaged blades (cushion/arm/tip) that may:
 - a. damage the belt,
 - b. damage the belt cleaner,
 - c. compromise belt cleaning efficiency.
6. Check for dirty strips on the belt, or signs of excess carryback.
7. Check pole for straightness.
8. Check side assembly fasteners are all tight.
9. Record all observations and estimates (eg. tip wear).

7 Maintenance

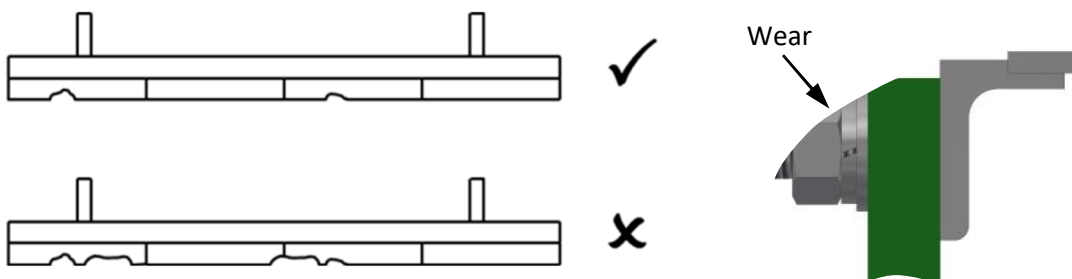
7.1 Physical Inspections

Physical Inspections can only be done when the conveyor is isolated. The following steps are recommended to perform a physical inspection on an H Belt Cleaner.

1. Follow all plant isolation procedures.
2. Wash or scrape away any material build-up on the tips, arms, cushions or pole.
3. Confirm correct installation (see Section 5).
4. Check tip alignment (see Section 5.2).
5. Check tip condition (see Section 7.2).
6. Measure tip wear (see Section 7.3). Replace any tips if required (see Section 7.4).
7. Measure tip tension (see Section 5.2).
8. Check arm condition.
9. Check cushion condition.
10. Check pole for straightness.
11. Check side assembly fasteners are all tight.
12. Record all observations and measurements (eg. tip wear, tip tension).

7.2 Evaluating Tip Condition

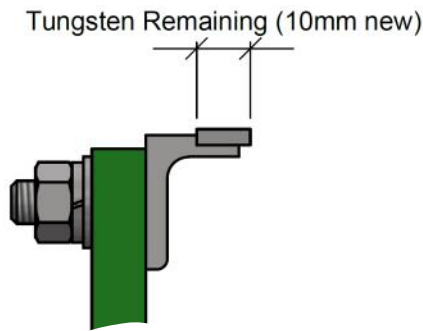
During “normal” tip wear the protruding section of tungsten wears to the point where both the tungsten and the steel body begin wearing away. Forms of “non-normal” tip wear include chipping of the tungsten elements, as shown in the LH diagram below, and wear from material washing over the back of the tip, as shown in the RH diagram below. If material wearing the back of the tip is an issue, Protected Tips can be used – see Section 8.1.



Note: there is no fixed rule on how much chipping is acceptable, rather it needs to be a judgement made based on factors including the condition of the belt, the risk of belt damage, etc.

7.3 Measuring Tip Wear

The amount of tungsten on a new tip is 10mm or 15mm. The amount of tungsten remaining is measured as shown in the following diagram. This measurement is to be recorded for each tip. If a single tip has uneven wear, the two end measurements can be recorded (eg. 5mm RHS, 7mm LHS).



7.4 Instructions for Replacing Tips

In order to replace one or more tips the tension must be backed off the belt cleaner. The following steps should be taken:

1. Check the tip tension of all tips (values can be written on the belt surface above each tip).
2. Remove the Denso tape from the J bolts & lock nuts.
3. Back off the J bolt lock nuts.
4. Back off the J bolts until the tips are ~ 20mm from the belt.
5. Remove the worn or damaged tip(s) and replace with new tips.
6. Tighten up the tip nuts.
7. Ensure the gap between tips is adequate to ensure adjacent tips do not bind with each other.
8. Reinststate the tension (refer to Section 5.2).
9. If there are significant tip tension differences ($> \pm 2\text{kg}$), shim blades accordingly (refer to Section 7.5 below).

7.5 Instructions for Shimming Blades

Shimming is required if:

- A tip is not parallel to the belt surface, or
- Tip tension on an individual blade is not within the desired range.

Shimming can be done between:

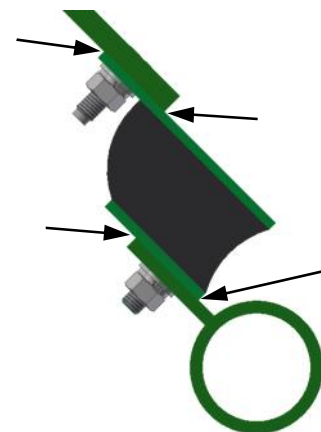
- The pole plate and the cushion, or
- The cushion and the arm.
(see RH diagram for shimming locations)

Shims should be inserted above or below the arm or cushion stud.

Shimming must be done with the tip tension backed off.

To move a tip in at one end only, place a short shim above the cushion stud, or the arm stud, on the side that must be moved in.

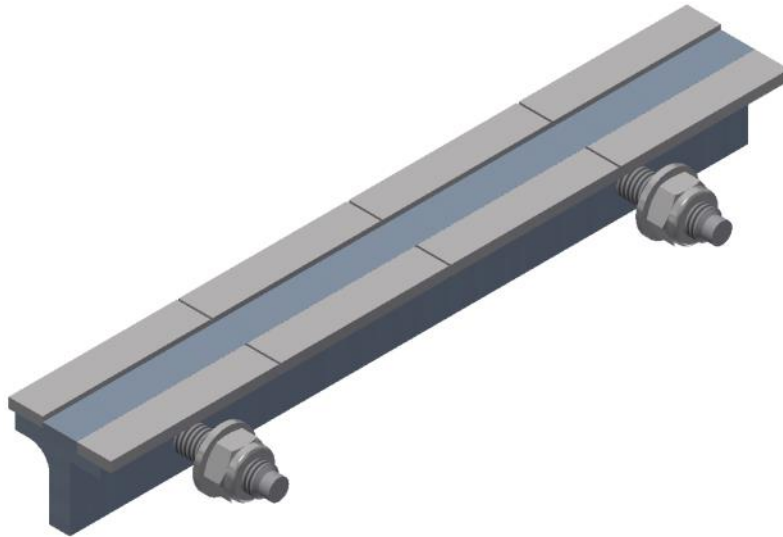
To move a tip in equally at both ends (eg. to increase tip tension on that specific blade), place shims above both cushion studs or arm studs. Note: do not use shims between the tip and the arm.



8 Additional Options

8.1 Protected (T) Tips

Protected tips have a strip of tungsten at the back, as shown below, which protect the nuts and thread on the tips from sticky material washing over the back of them.



8.2 Polyurethane Blades

For applications where the belt is damaged, or the mechanical clips or fasteners are in use, polyurethane blades, with a combined tip and arm, can be used. Contact Belle Banne Conveyor Products for more information.

