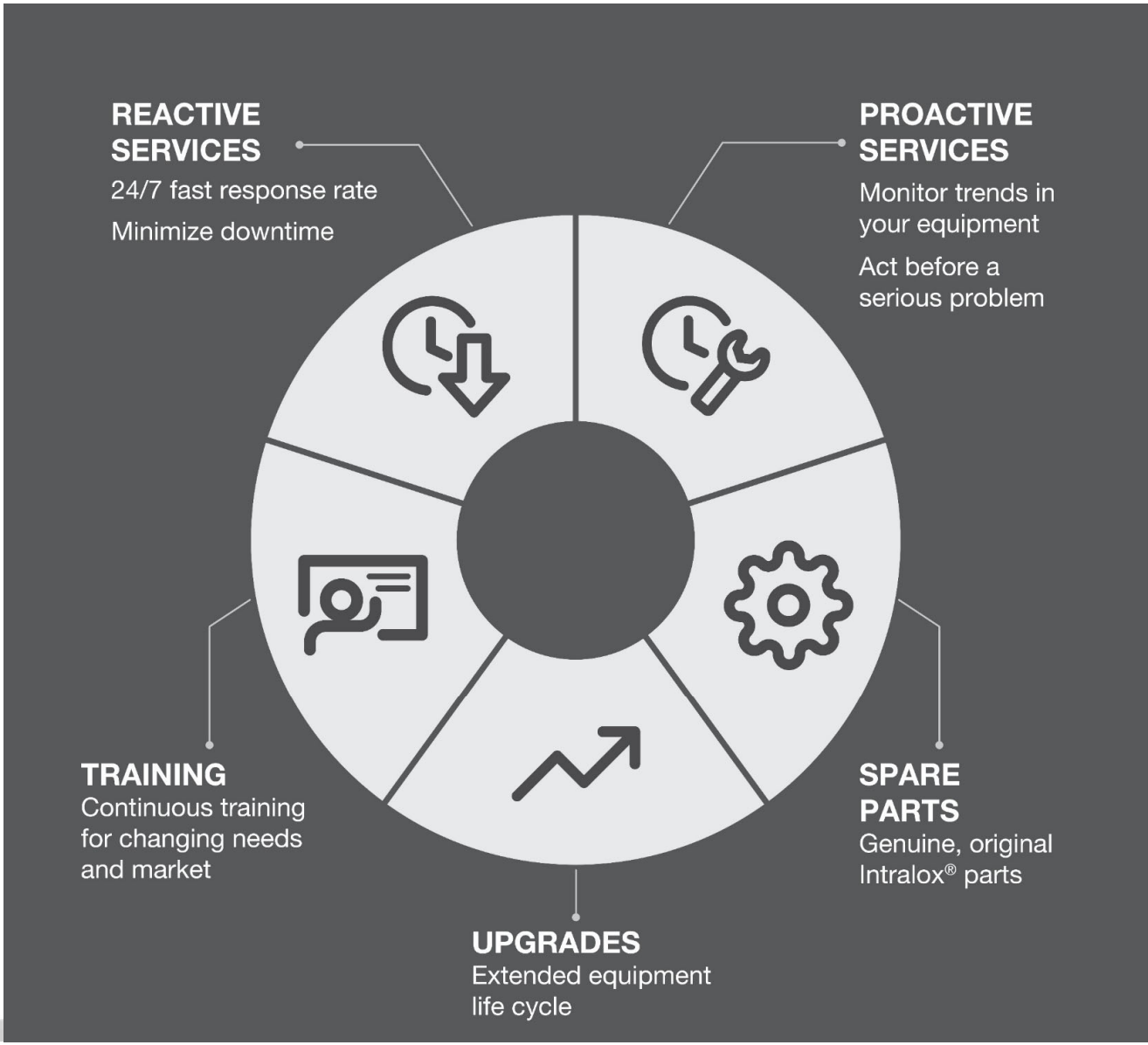
Maintenance Training
S7000 V4 Sorter
ADTA

Introduction to Intralox

We can provide...

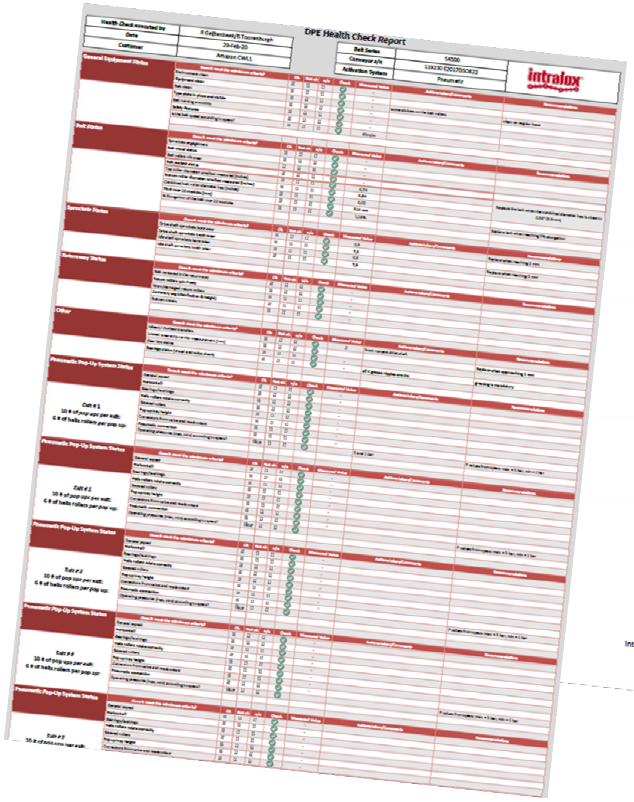


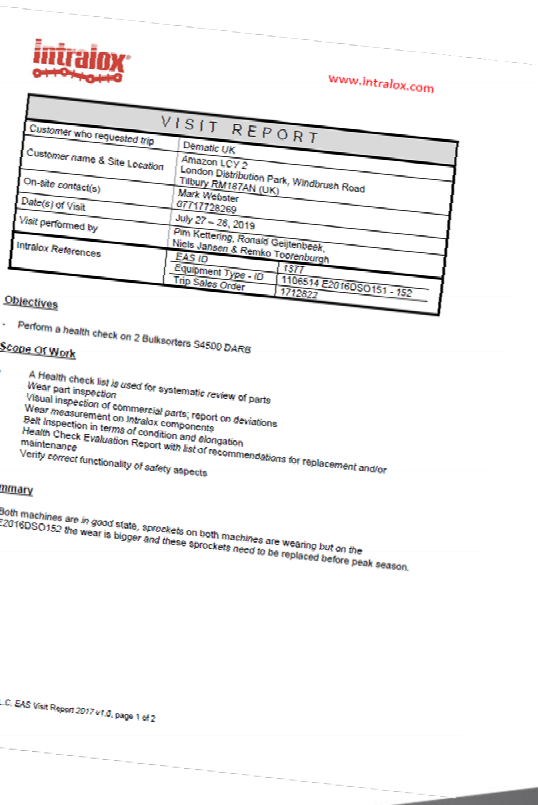
Reactive Services

- We provide 24/7 Customer Service
  - A single toll-free number gives you access to industry focused technical support and trouble shooting, quotes, order information and tracking, etc.
- On-site or any other customer preferred method (phone call, WebEx, Teams, etc.)

Intralox Customer Service
Phone: Your local number can be found at
https://www.intralox.com/support/phone-numbers
Email: Service.EMEA@Intralox.com

Proactive Services – Health Checks/Upgrades


DPE Health Check Report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VISIT REPORT

Customer who requested trip	Dematic UK
Customer name & Site Location	Amazon LCY 2 London Distribution Park, Windbrush Road Tilbury RM187AN (UK)
On-site contact(s)	Mark Webster 07717728269
Date(s) of Visit	July 27 – 28, 2019
Visit performed by	Pim Kettering, Ronald Geijtenbeek, Niels Jansen & Remko Toorenburgh
Intralox References	EAS ID: 1377 Equipment Type - ID: 1106514 E2016DSO151 - 152 Top Sales Order: 1772822

Objectives

- Perform a health check on 2 Bulksorters S4500 DARB

Scope Of Work

- A Health check list is used for systematic review of parts
- Wear part inspection
- Visual inspection of commercial parts; report on deviations
- Wear measurement on Intralox components
- Belt inspection in terms of condition and elongation
- Health Check Evaluation Report with list of recommendations for replacement and/or maintenance
- Verify correct functionality of safety aspects

Summary

- Both machines are in good state, sprockets on both machines are wearing but on the E2016DSO152 the wear is bigger and these sprockets need to be replaced before peak season.

Intralox, L.L.C. EAS Visit Report 2017 v1.0, page 1 of 2

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Spare Parts

- Original Intralox parts.
- Offering:
  - Individual Parts.
  - Kits.
  - 3rd party replacement parts. (sensors, Festo valves, etc.)

Training

- Intralox offers training and evaluation, certification, consultancy, and education, as a theoretical or hands-on session, covering:
  - System Overview Training
  - Operations Training
  - Maintenance Training
- Standard and customizable options are available on-site, off-site, and via WebEx

End in mind

This training provides maintenance personnel and operators an understanding of Intralox system:

- Functionality.
- Factors influencing performance.
- Maintenance.

Training Outline

1. Scope of delivery.
2. What everyone needs to know.
3. System functionality.
    1. Modular Plastic Belt. (MPB)
    2. Activated Roller Belt. (ARB)
    3. Activation methods & Controls.
4. System Performance.
    1. Influencing Factors.
5. Maintenance & Troubleshoot.
    1. Relevant sections in the User Manual.
    2. Preventive Maintenance.
    3. Maintenance.
    4. Tools for splitting the belt.
    5. How to split the belt.
    6. How to close the belt.
    7. Troubleshoot.

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1.Scope of delivery

2.What everyone Needs To Know

1.Safety.

2.Added value of the User Manual.

3.Tools and how to use them.

2.What everyone Needs To Know

1.Safety.

2.Added value of the User Manual.

3.Tools and how to use them.

- Always apply safety protections as described by your company and according to your countries regulations like LOTO or LOTOTO.
- Prior to start up always perform a safety inspection.
- Always keep appropriate safety distances and other precautions as discribed in the User Manual.
- In case of jammed product always turn OFF the power of the equipment before performing any operation of the machine.

2.What everyone Needs To Know

1.Safety.

2.Added value of the User Manual.

3.Tools and how to use them.

- Be familiar with the content of the User Manual.
  - Maintenance.
  - Cleaning.
  - Spare parts.
  - Troubleshoot.
  - Contact information.

- The User Manual is shipped with your Intralox solution bought.

2.What everyone Needs To Know

1.Safety.

2.Addded value of the User Manual.

3.Tools and how to use them.

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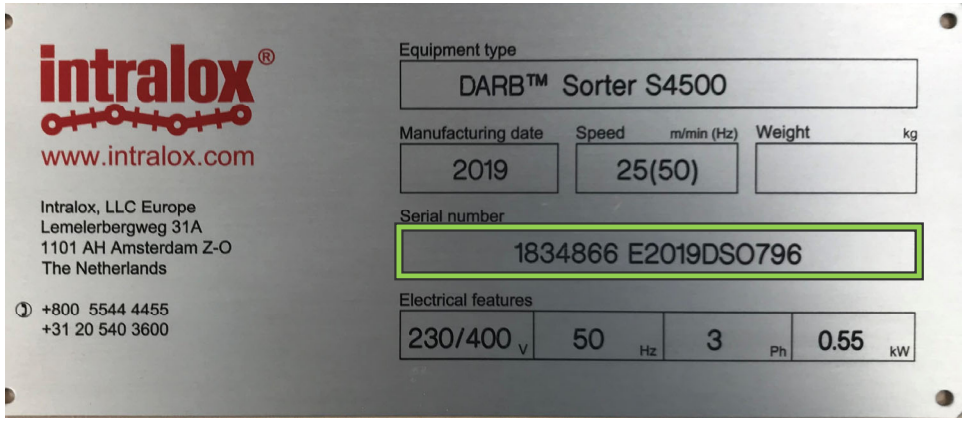
Equipment Identification Name (EIN) Plate

- The EIN plate displays the following information:
  1. Name and address of the manufacturer
  2. Year of manufacture
  3. Serial number
  4. Equipment type
  5. Total weight
  6. Electrical features
  7. Legal markings (if applicable)
  8. Directions to use the User Manual when necessary



2.Examples of Intralox Safety Features

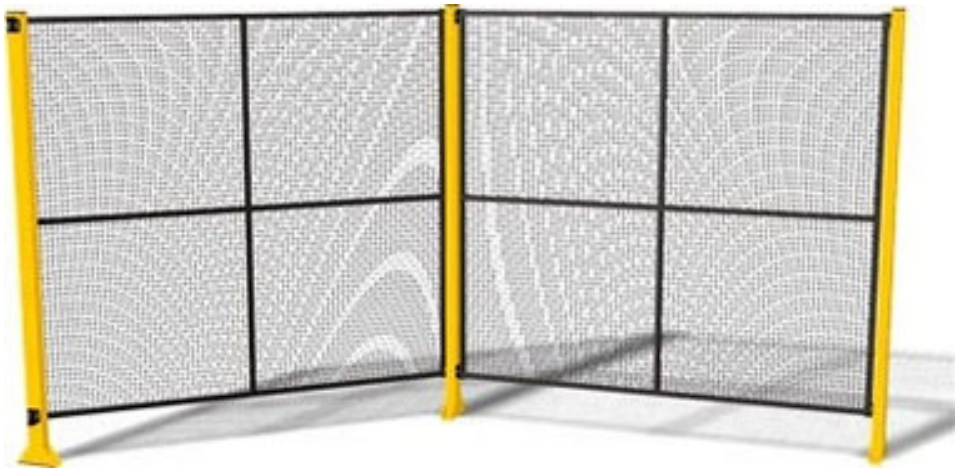
- Inspection window.

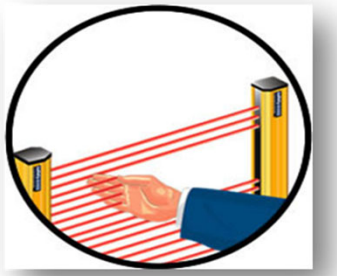
- Safety stickers.
- Bearings caps on the outside.

2.Intralox doesn’t supply

- Emergency stop.
- Fence or Infrared barrier.

These safety devices can be installed by the integrator or end user.





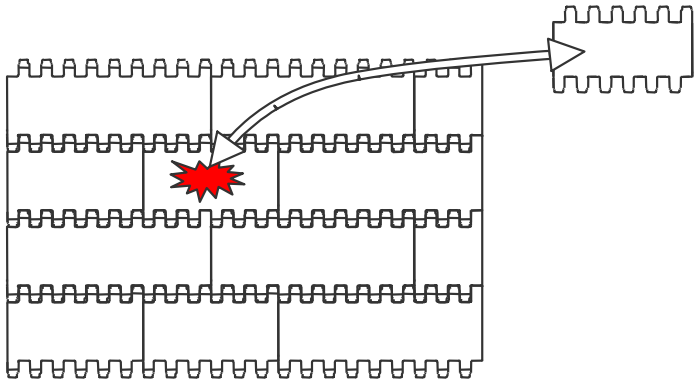
3.Systems Functionality

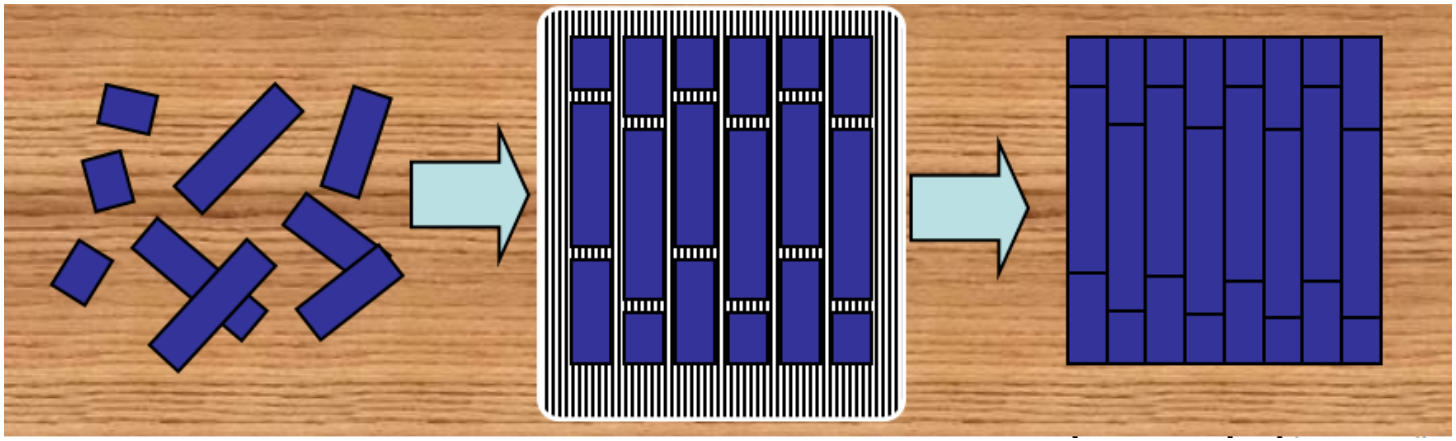
1. Modular Plastic Belt. (MPB)
2. Activated Roller Belt. (ARB)
3. Activation Methods & controls.
4. Mechanical Overview.

Introduction to Modular Plastic Belting

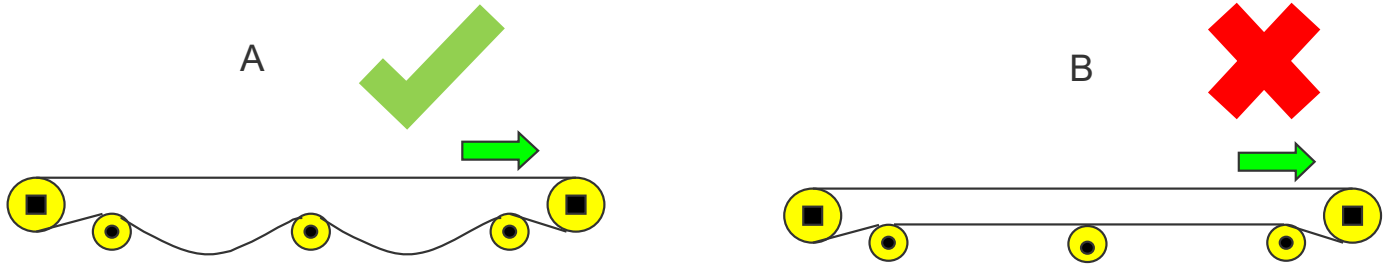
3.1 Modular Plastic Belt

- Belt = Rods + Modules
- Brick laid modules form any belth width
- Damaged modules easily replaced.





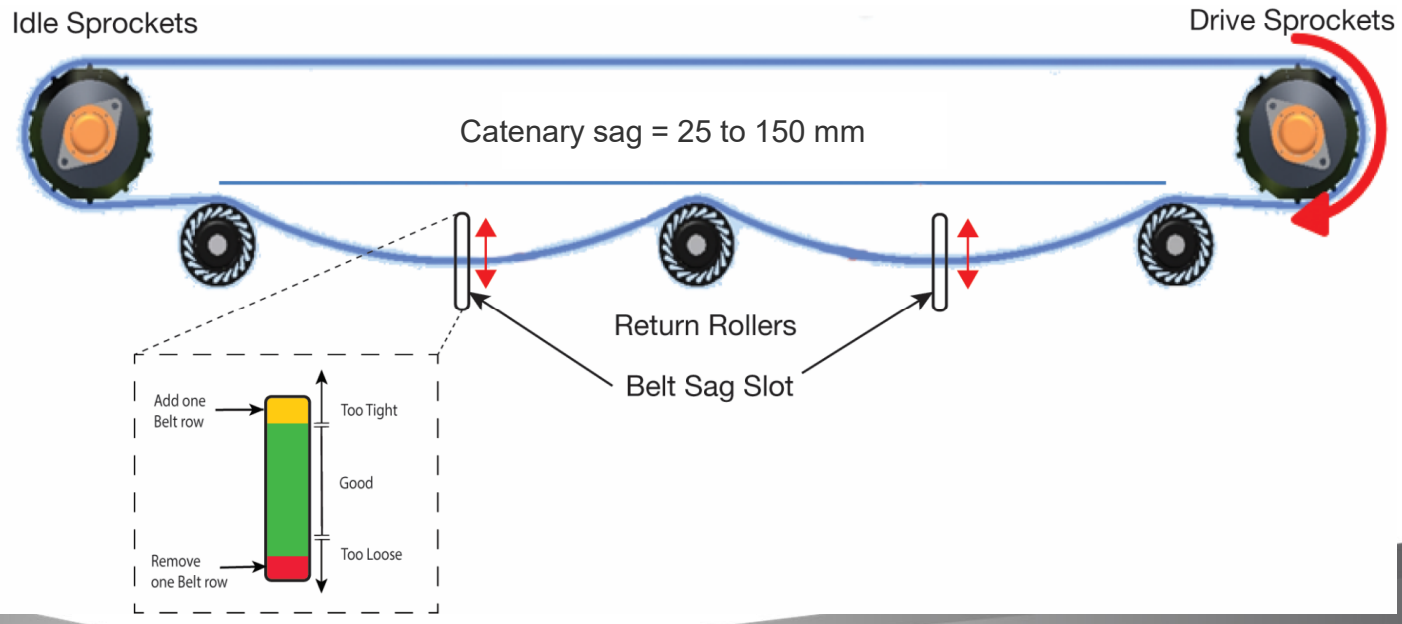
3.1 Modular Plastic Belt



- Low tension system.
- Less loads on shafts, bearings and drives provides:
  - Longer component life.
  - Reliable.
  - Less maintenance.

3.1 MPB Tensioning Requirements

- The catenary sag between snub rollers should be between 25 to 150 mm.
- This catenary sag is maintained by adding or subtracting rows to the plastic belting.



3.1 MPB Tensioning Requirements

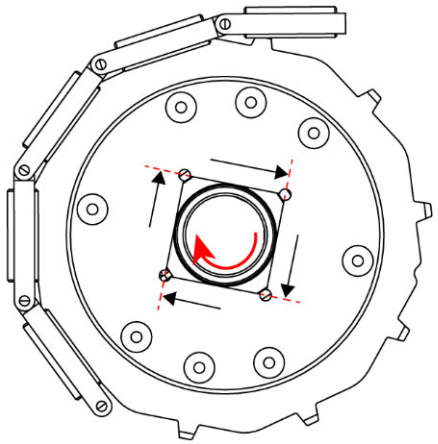
- During the first few months of operation, it is typical for a plastic conveyor belt to ‘stretch’ between 0.5–1% during the initial break-in period. This growth is normal and is expected.
- It is permissible after this initial break-in to reduce the conveyor belt sag by removing a few rows of belting. It is recommended to remove one row of belting at a time, run the belt and then examine the resulting catenary sag.

3.1 MPB Shaft Design

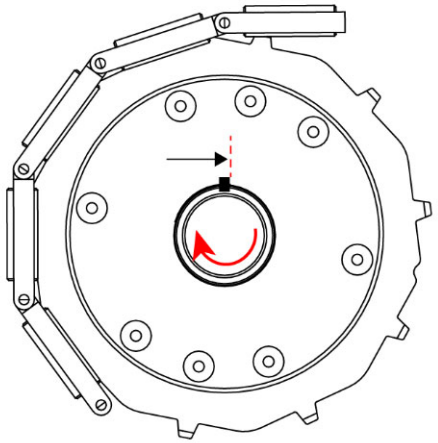
- Intralox MPB conveyors utilizes a square shaft design
- This allows for even torque distribution around the entire sprocket, where traditional, round shafts transmit torque through keyways or press fit sprockets
- Increased loading on traditional, round shafts can either shear the key or cause the press fit sprocket to slip

The square shaft design allows higher loading due to a more even torque distribution

Square Shaft to Sprocket - Torque Transfer



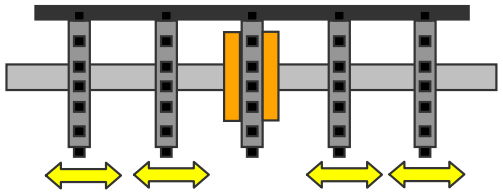
Round Shaft with Woodruff Key to Sprocket - Torque Transfer



3.1 MPB Sprockets

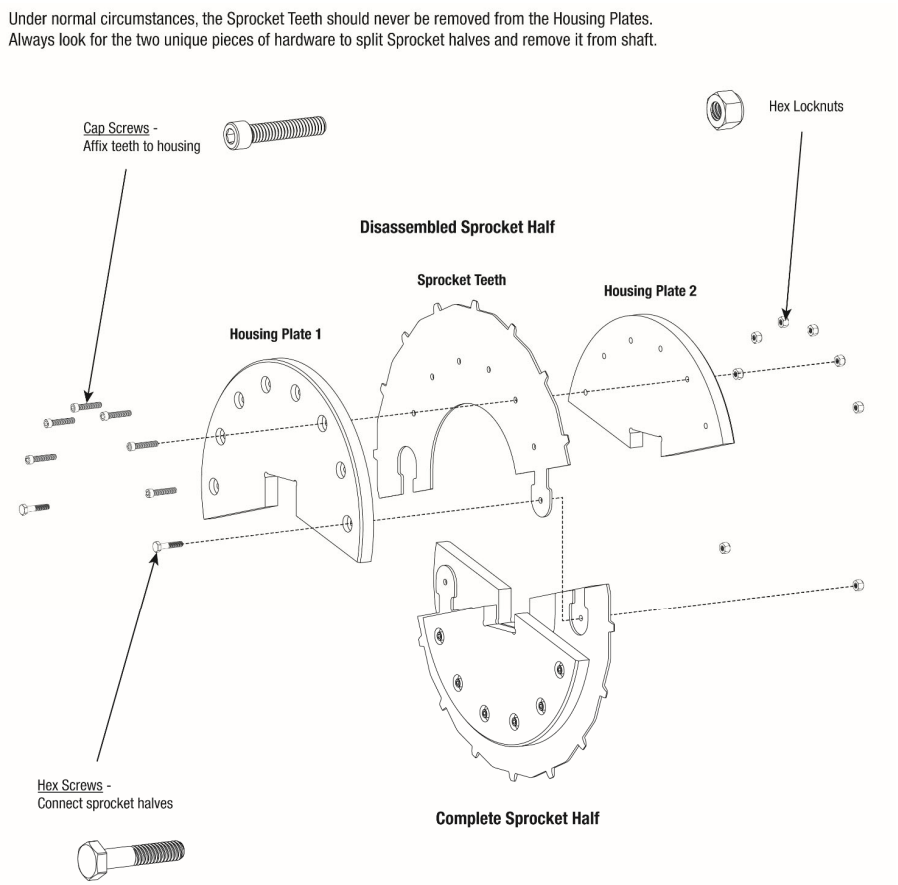
- Retaining rings/split collars lock the centermost sprocket in place, which tracks and centers the belt
- Remaining sprockets are free-floating on the shaft, or have more retaining ring clearance:
  - This allows sprockets to move along shaft with thermal expansion of belt.

All of the sprockets are free floating on the shaft except for the centermost sprocket.



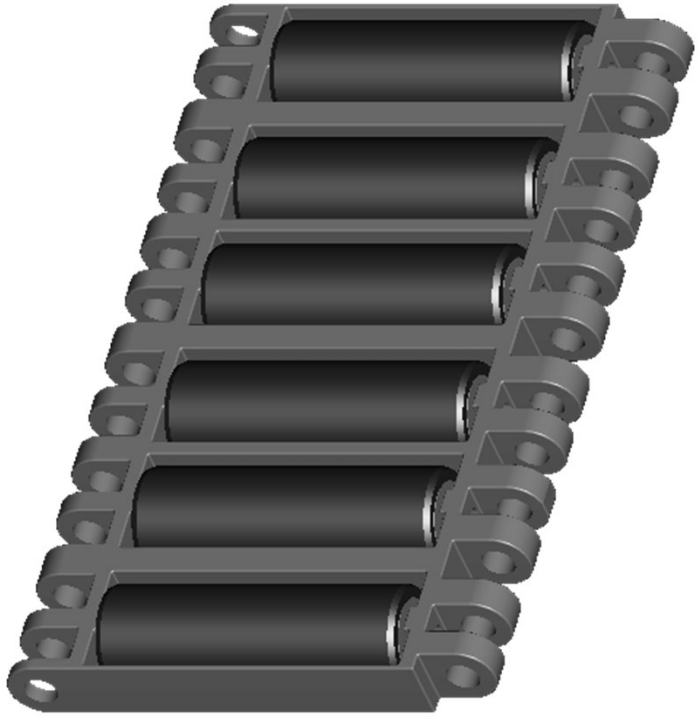
3.1 MPB Sprockets

- Sprockets are constructed in a split-collar design
- By loosening and removing the two unique screws, the sprocket will split in half and allow for easy removal from the drive shaft
- This prevents the need to remove the drive shaft from the conveyor to replace the sprockets
- Locknuts are one-time use



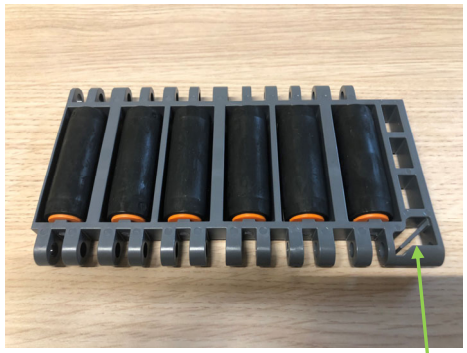
3.2 Activated Roller Belt – S7000

- Belt pitch: 3,19” (81mm)
- Acetal belt + nylon rods.
- High friction rubberized rollers diameter 19mm.
- Lateral roller spacing 1”(25,4mm).
- High roller density aids in diverting difficult products.
- Split metal sprockets:
  - (8 teeth; Ø 211mm);
  - (10 teeth: Ø 263mm);
  - (16 teeth: Ø 416mm);
- Belt and sprockets are stock items in Europe.



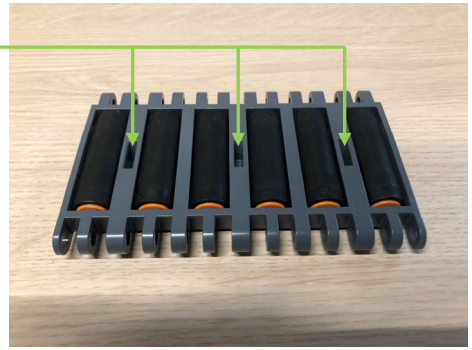
3.2 Activated Roller Belt – S7000

Similar to a MPB belt an ARB belt is build up out of modules, we use interior and edge modules and combine these with rods to a belt.



Edge module within the right corner the “barndoor” this is used to retain the rods.

Interior module (top view).

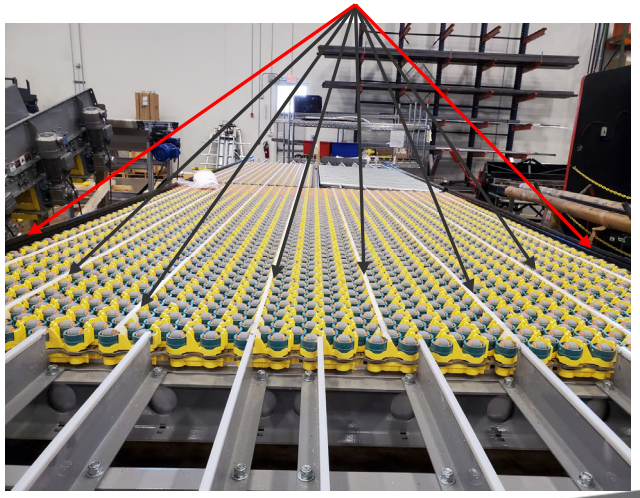


Interior module (bottom view) here you also see the pockets were the sprockets will engage the belt.

3.2 How it Works – ARB S7000

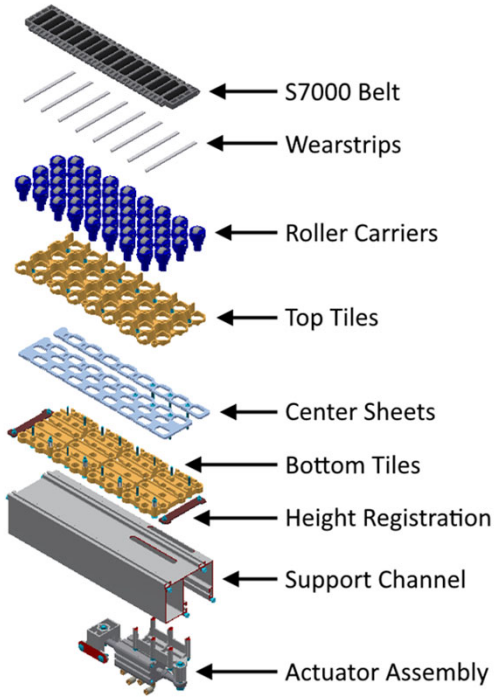
3.2 Activation – S7000 V4 Rack and Roll

- How does it work?
  - The S7000 belt can be activated by bringing rollers under an angle in contact with the belt.
  - Rollers are placed in a rack.
  - Roller angle is changed by using a rack and pinon system.
  - Belt is not supported anymore by the RnR carrier rollers but by the white wearstrips and the black side bar caps.

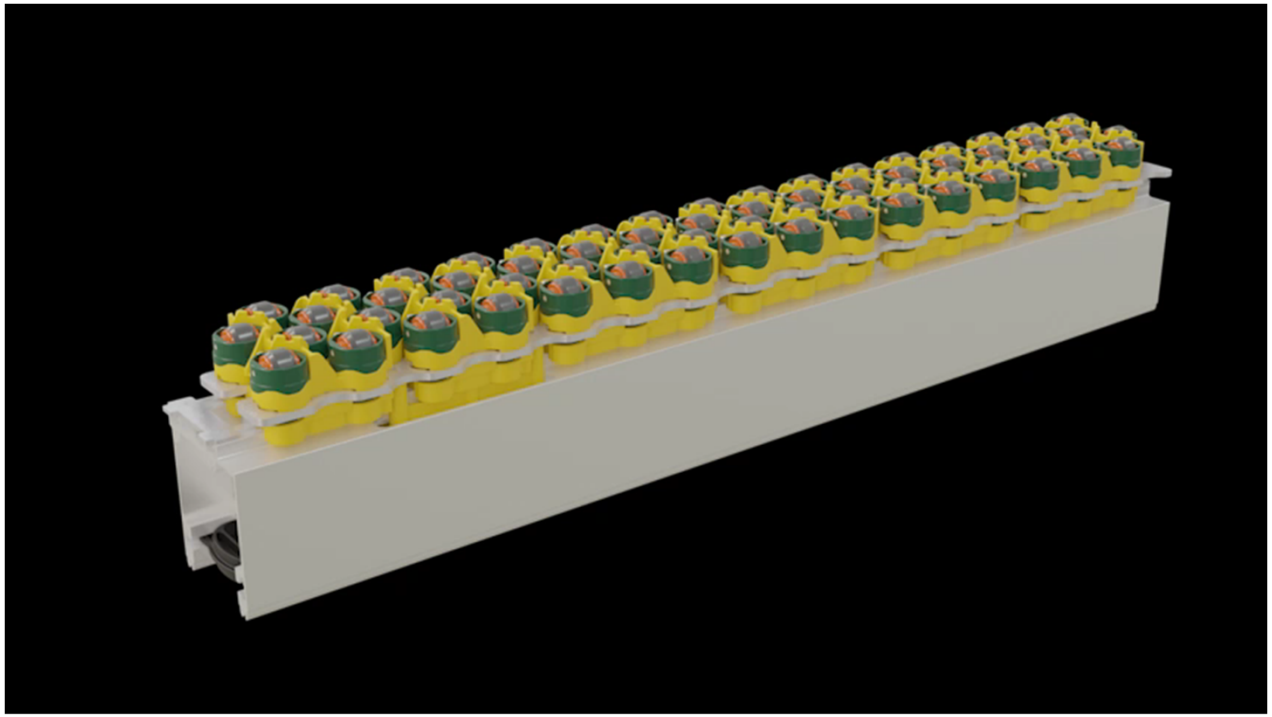


3.2 Activation – S7000 V4 Rack and Roll

- In idle position (straight) the belt rollers are not touching the belt so no activation to left or right is possible.
- During activation to left or right the RnR carrier moves not only in left or right direction but also upwards.

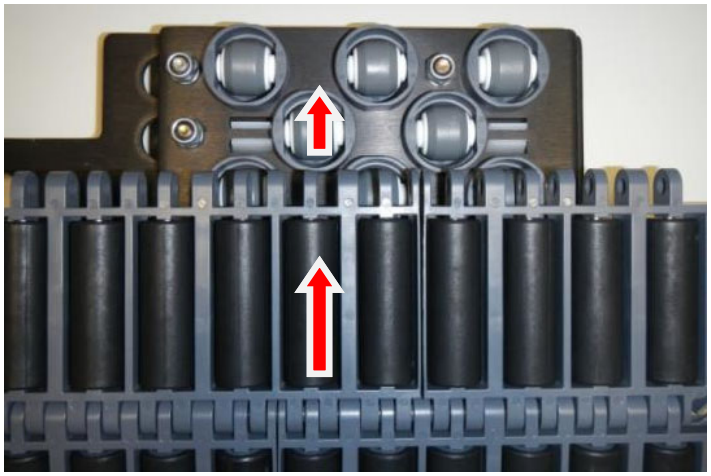


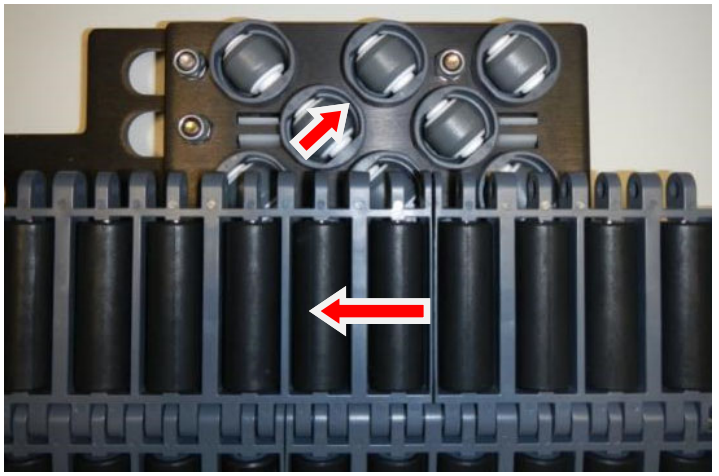
3.2 Activation – S7000 V4 Rack and Roll



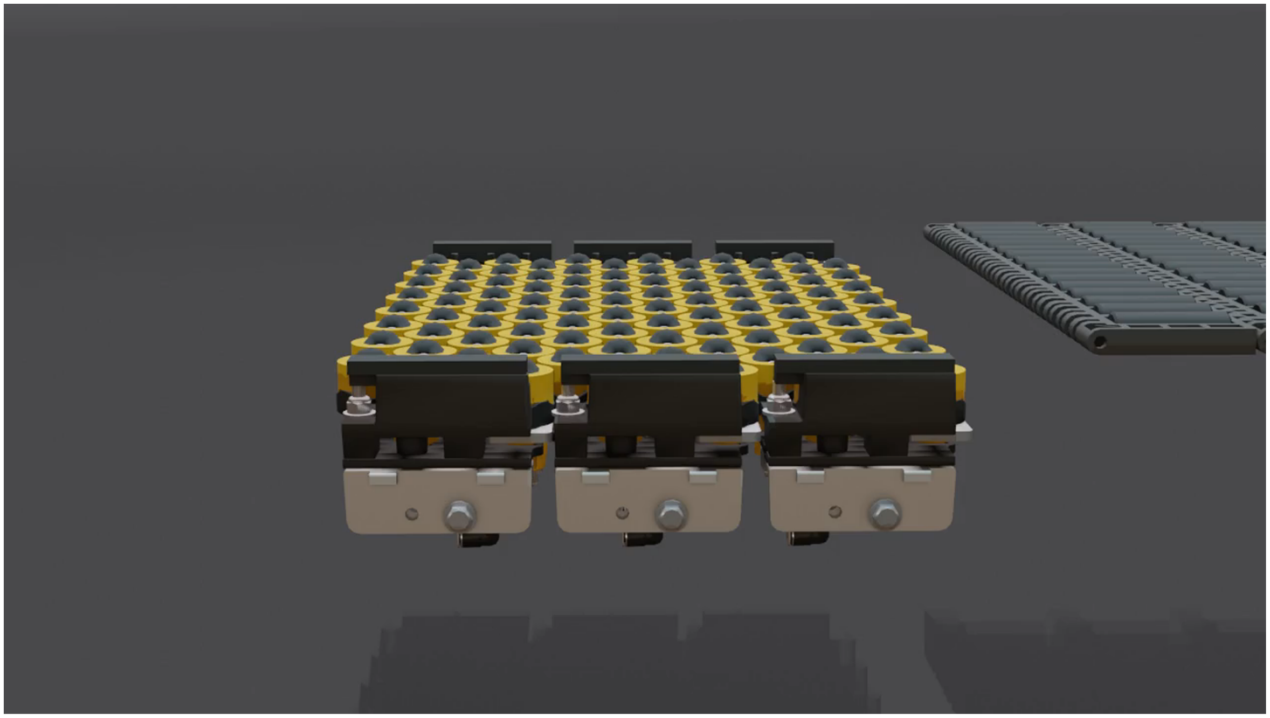
3.2 Activation – S7000 Rack and Roll

- When the RnR rollers standing in a straight line compared to the belt rollers no belt movement will occur, product will stay on the same position of the belt.
- When the RnR rollers are set to the right, the belt rollers will start spin to the left and vice versa.

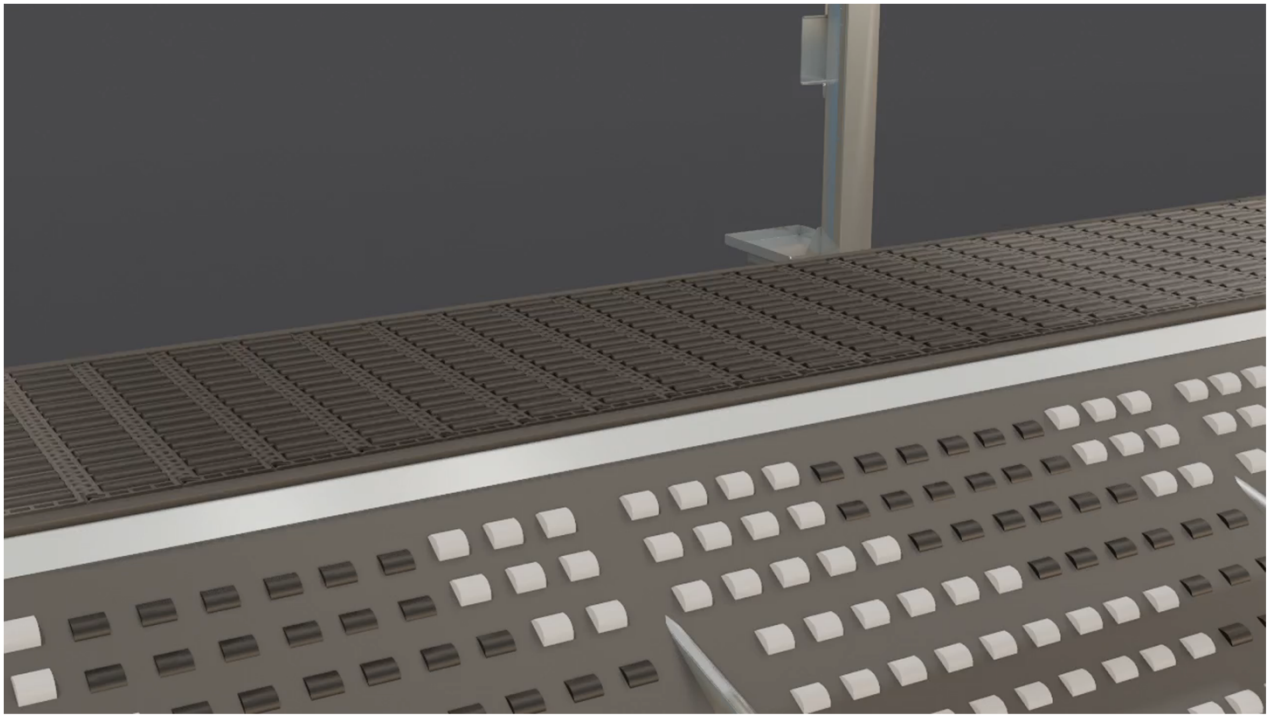




3.2 Activation – S7000 Rack and Roll



3.2 Activation – S7000 Rack and Roll



3.3 Activation Method & Controls

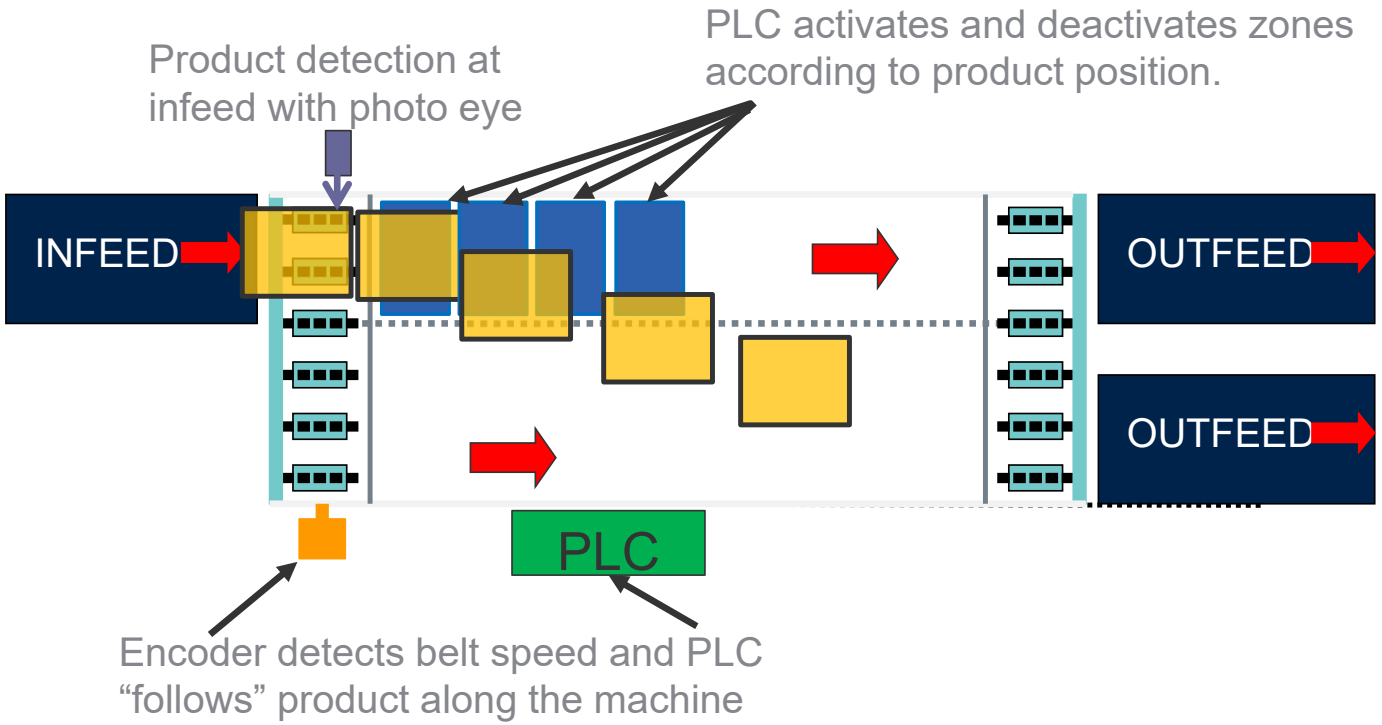
- Pneumatic.
- How to control.

3.3 Pneumatic Activation S7000

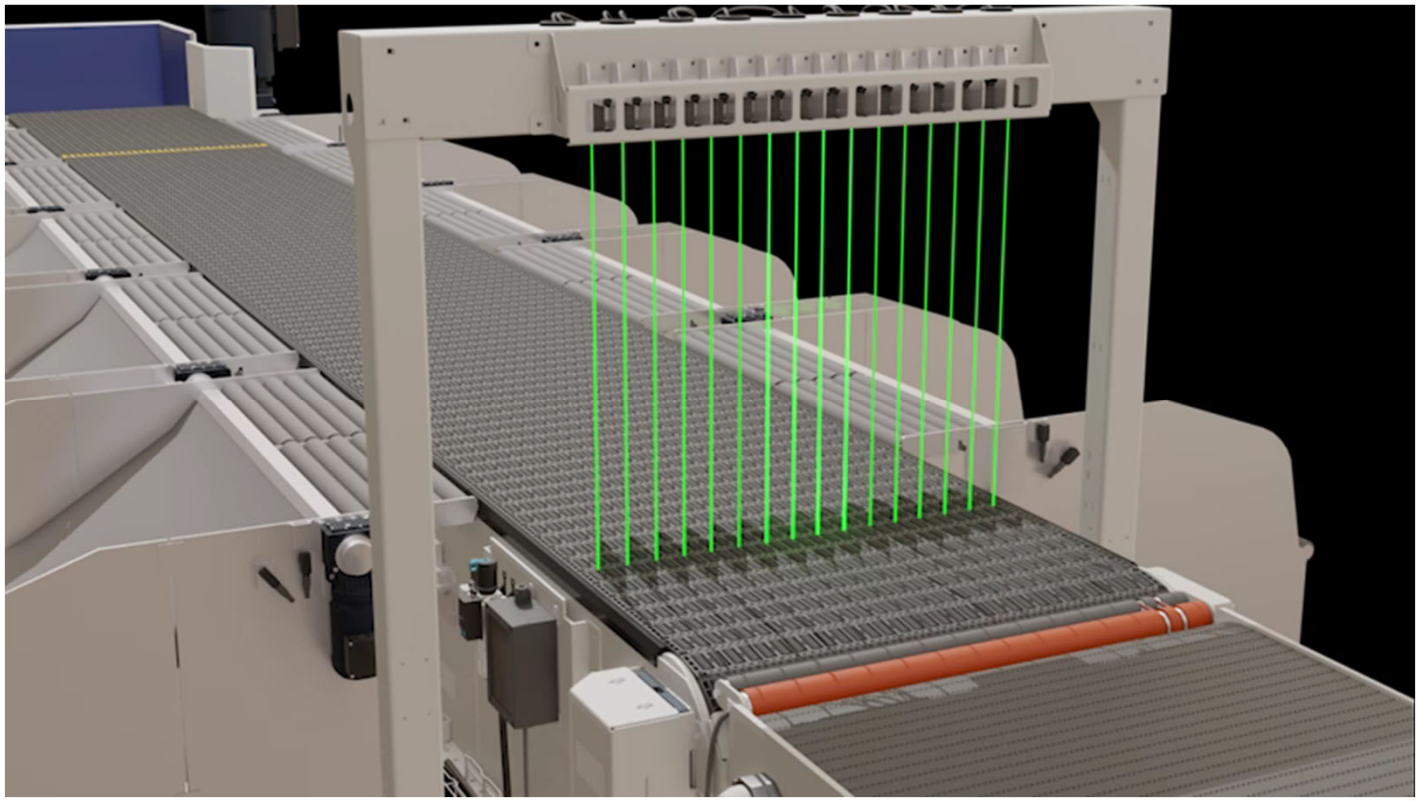
- Apply Intralox recommended pressure (4bar) for optimal performance. Using higher pressure as recommended will result in higher wear to Intralox components.
- Pneumatic circuit must flow without lubricant.
- Schematic in manual.
- Air Quality – should be without dust or humidity.

3.3 Controls Concept S7000

- General control concept

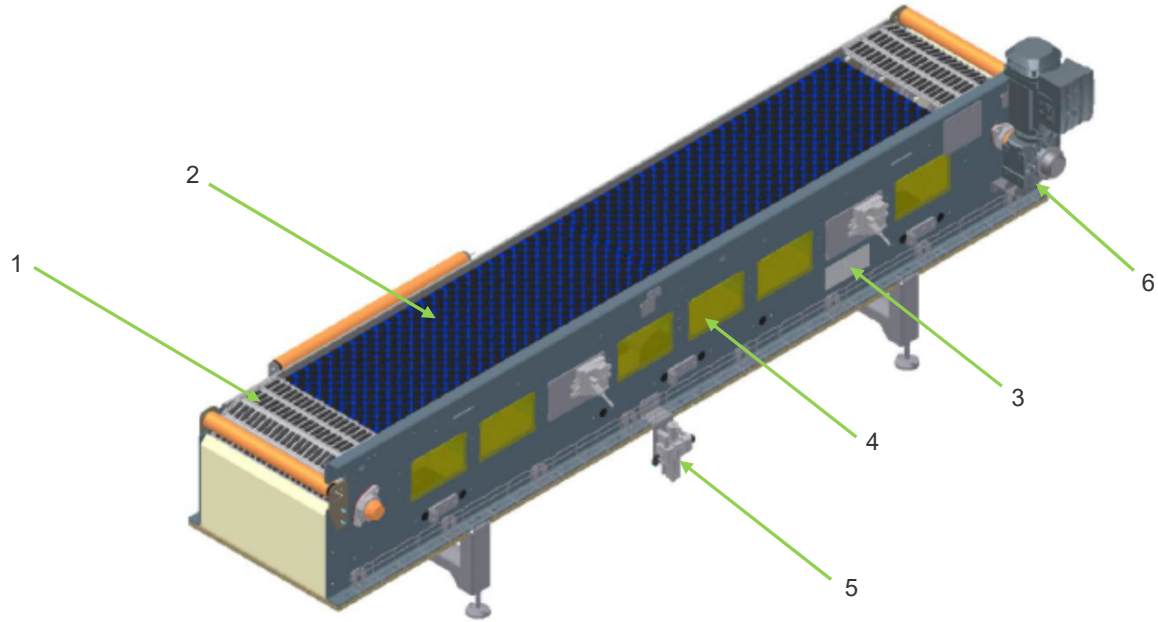


3.3 How to control

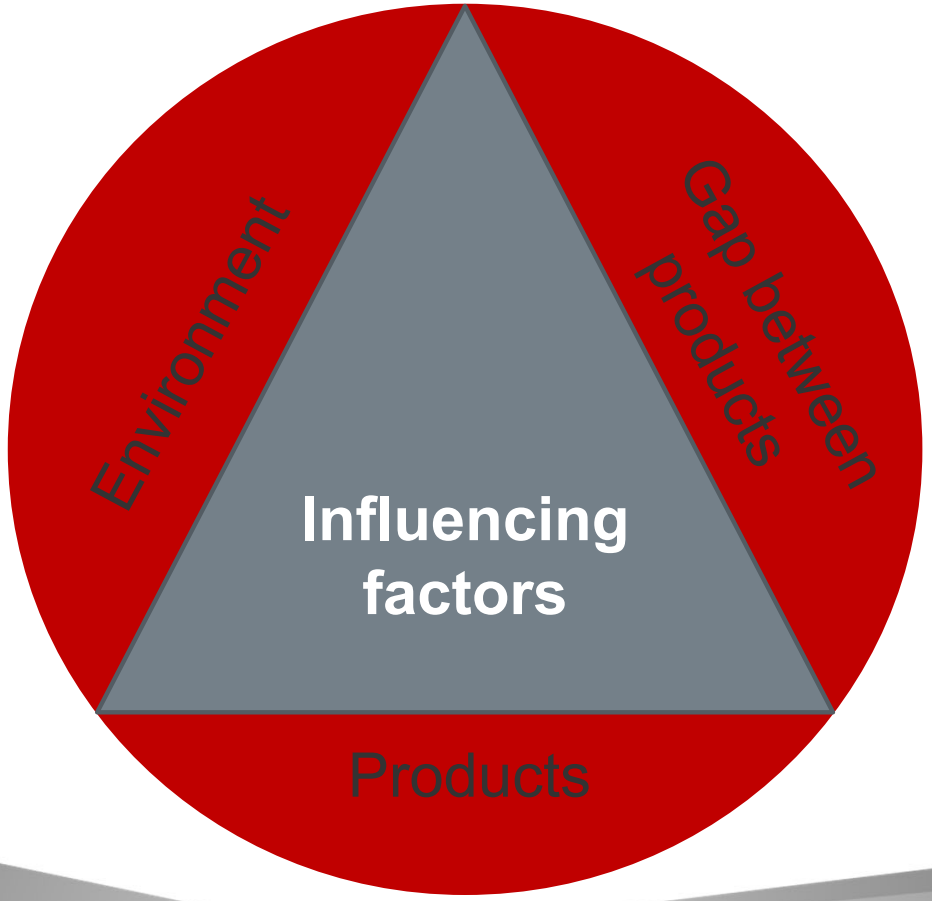


3.4 Mechanical Overview S7000

1. Conveyor belt S7000.
2. Carryway roller actuator.
3. EIN plate.
4. Inspection window.
5. Pneumatic components.
6. Drive motor.



4 System Performance

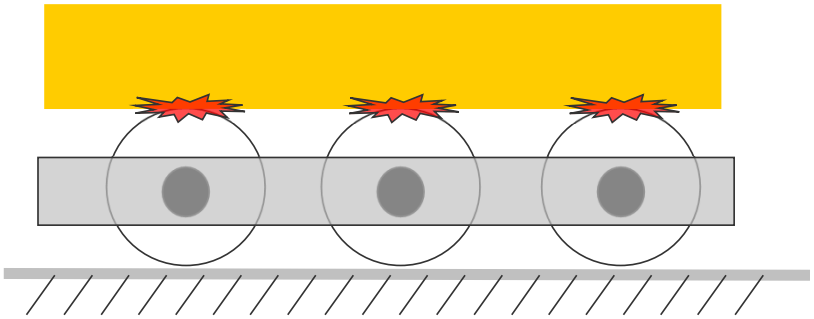


4.1 System Performance - Enviroment

Friction is required for proper operation

Environment influences friction

- Lubrication (water,..)
- Grease / Oil
- Ice build up
- Dust / Dirt …..



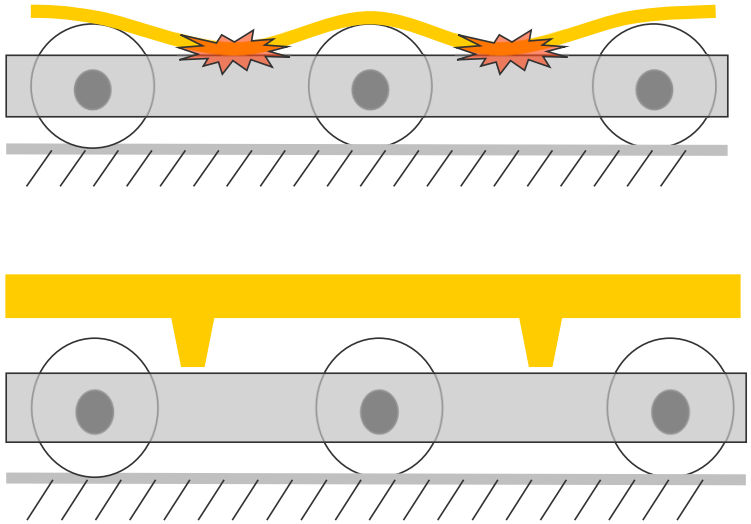
Cleaning is important for optimal system performance

4.1 System Performance - Products

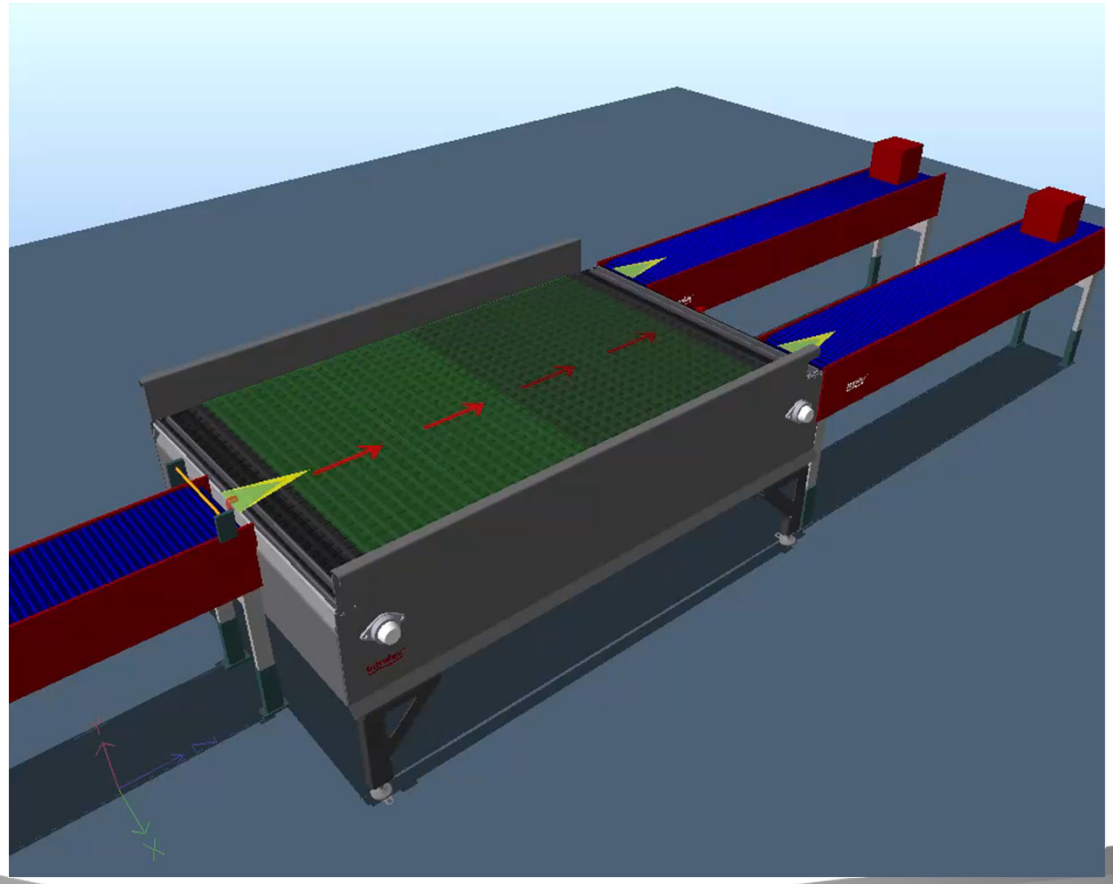
Good Contact is needed between belt rollers and products

- Soft products (bags,..) could „sink-in“ and contact belt surface.
- Uneven products (crates, rolls…) could make contact with the belt in between ARB roller.
- Damaged products.

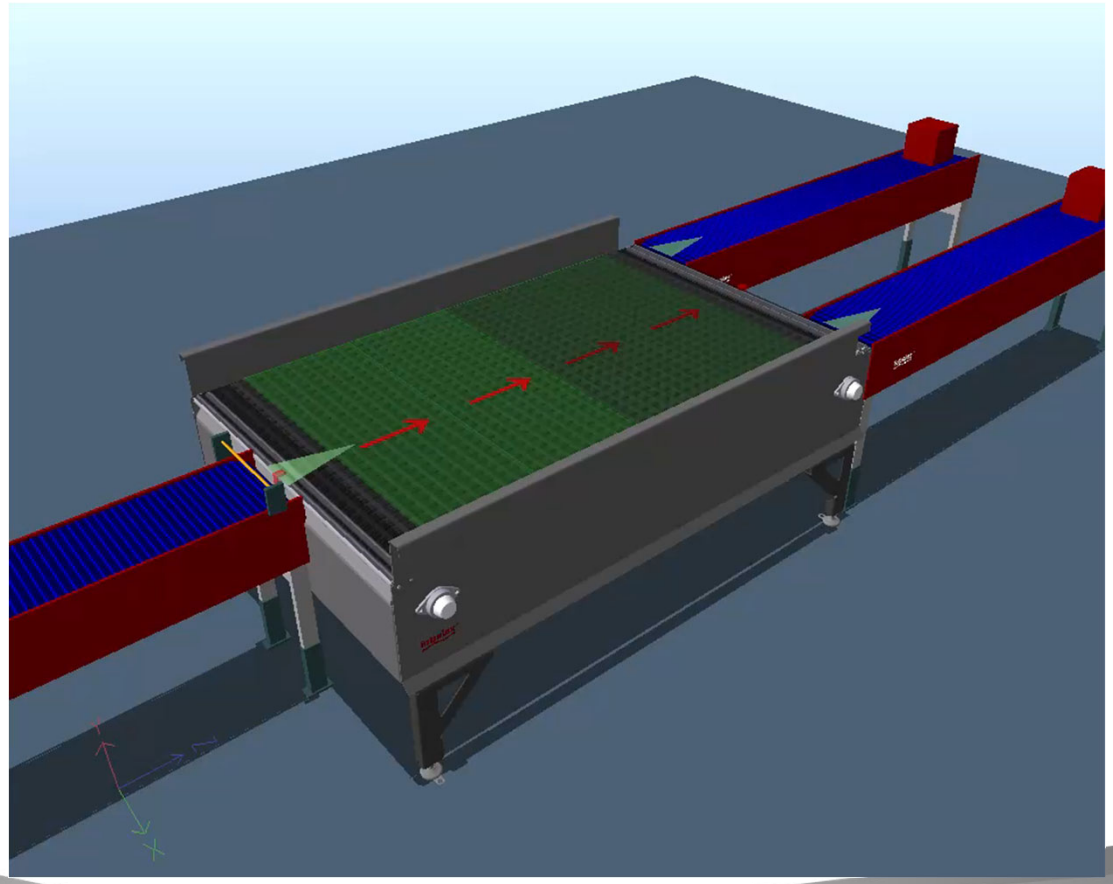
Correct product side movement is only possible when the product has good contact to the ARB rollers!! Bottom surface may influence performance.



4.1 System Performance – Good Gap



4.1 System Performance – Gap to small



5. Maintenance & Troubleshoot

1. Relevant sections in the User Manual.
2. Preventive Maintenance.
3. Maintenance.
4. Tools for splitting the belt.
5. How to split the belt.
6. How to close the belt.
7. Troubleshoot.
8. Hands on part.

5.1 Relevant Sections in the User Manual

Recommended maintenance schedule at different time intervals.

- Daily.
- Monthly.
- Quarterly.
- Annually.

For full maintenance schedule see Appendix C of Intralox User manual.

MAINTENANCE SCHEDULE

Minimum Frequency after start-up	Maintenance after 1 month	Maintenance after 3 months	ARB™ Equipment Component	Check for (and correct if required)
Daily			Complete system including safety features	Visual
Daily			Complete system	Noise or vibration
Daily			Modular plastic belt	Cleanliness
Monthly			Floor and complete system	Cleanliness *NOTE: inspect the floor and conveyor frame for "plastic dust" that may indicate the ARB belt is being abraded by something; act accordingly.*
Monthly			Modular plastic belt	Missing or damaged return rollers, shoes, or wearstrips
Monthly			Modular plastic belt	Connecting rods that are protruding out of the belt (or missing rods); check connecting rods for wear
Monthly			Modular plastic belt	Missing or damaged ARB rollers and weld caps, signs of wear and dirt, and material build up.
Monthly			Side guide rails *	Visual
Monthly			Service unit *	Condensation
Quarterly			Polymeric side guides	Visual
Quarterly	Yes		Modular plastic belt	Belt - top and bottom (cuts, gouges, etc.).
Quarterly			Filter in front of the fan in electrical cabinet *	Contamination
Quarterly	Yes		Helix rollers *	Spin correctly
Quarterly			Idle end infeed (Transfer)	Damage or irregularities
Quarterly			End outfeed (Transfer)	Damage or irregularities *NOTE: If applicable, replace pop-out roller every 2 years minimum as a safety precaution.*
Quarterly			Emergency stop *(not provided by Intralox;*	Irregularities

407469-8625-08073 – DEMATIC – GOLDEN STATE FC LLC (ONT6)
ARB Equipment Maintenance Schedule v1.0 2 / 5

5.2 Belt Elongation Pitch Measurement

- MPB will begin to stretch or elongate over time due to wear on the hinge rods or enlargement of the module hinge rod holes.
- The belt is more likely to disengage from the drive sprockets if the belt elongation is more than 3%. By increasing the belt tension (removing belt modules), the risk of engagement issues due to the belt stretch can be reduced.
- When the belt elongation approaches or exceeds 5% and displays any sign of sprocket disengagement or module breakage, full belt replacement is recommended.

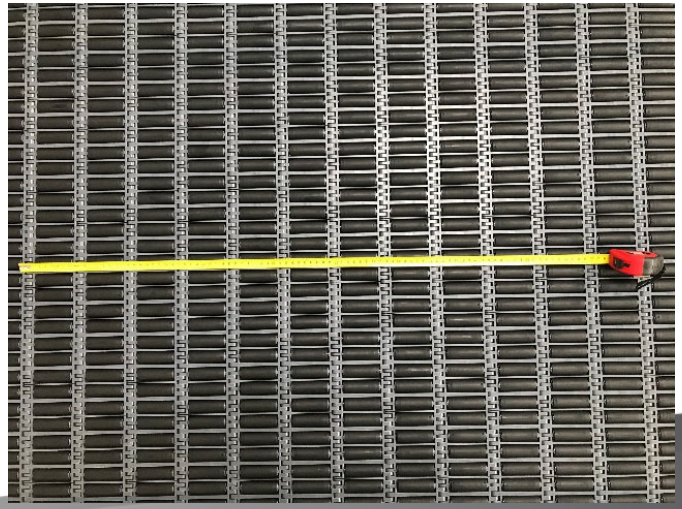
5.2 Preventative Maintenance – Belt Elongation S7000

1. Run the equipment unloaded, then stop and lock it out. This takes any backlash out of the belt.
2. Take a measurement over 10 modules. (the base module is 81 mm so in theory a new belt should 10x81=810mm). 3% of elongation is acceptable
3. The elongation of the belt can be calculated using the following formula: (assume we measure 815mm on the belt).

$$\text{Elongation} = \frac{\text{Measurement} - 810\ \text{mm}}{810} \times 100$$

$$\text{Elongation} = \frac{815 - 810\ \text{mm}}{810} \times 100 = 0.61\%$$

Pitch elongation less than 3%, so belt still OK.



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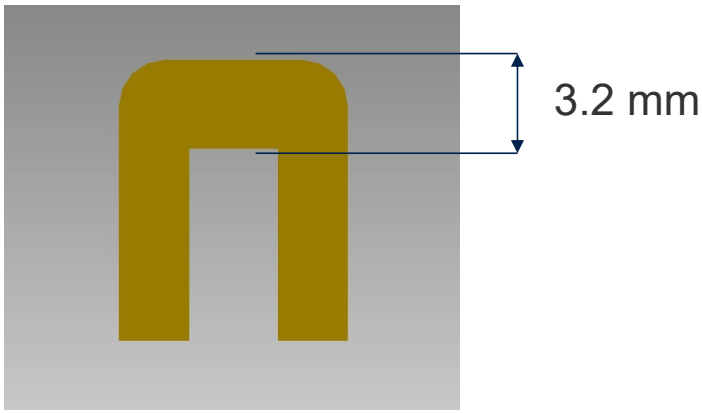
5.2 Preventative Maintenance – Wear Strips

When should we replace a wear strip?

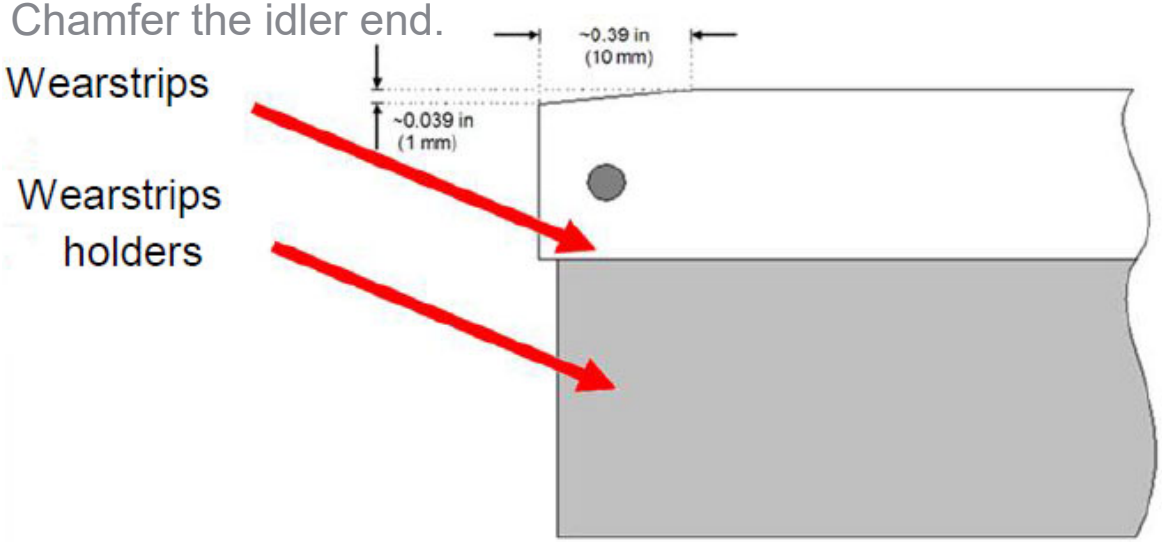
1. A new wear strip has a thickness of 3.2mm at the top surface.
2. If the thickness is getting below 1 mm a new wear strip should be installed.



5.2 Preventative Maintenance – Wear Strips

Main steps for mounting wear strips.

1. Mount the wear strip on the holder.
2. Fasten the wear strips.
3. Chamfer the idler end.



5.2 Preventative Maintenance – Sprockets

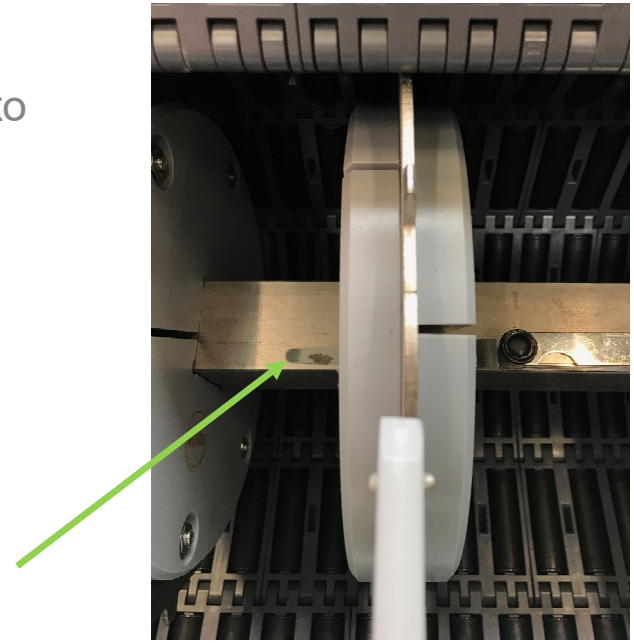
Sprocket bore wear measurement.

To measure the gap between the bore of the sprocket to his related shaft a feeler gauge can be used.

5.2 Preventative Maintenance – Sprockets

Sprocket bore wear measurement.

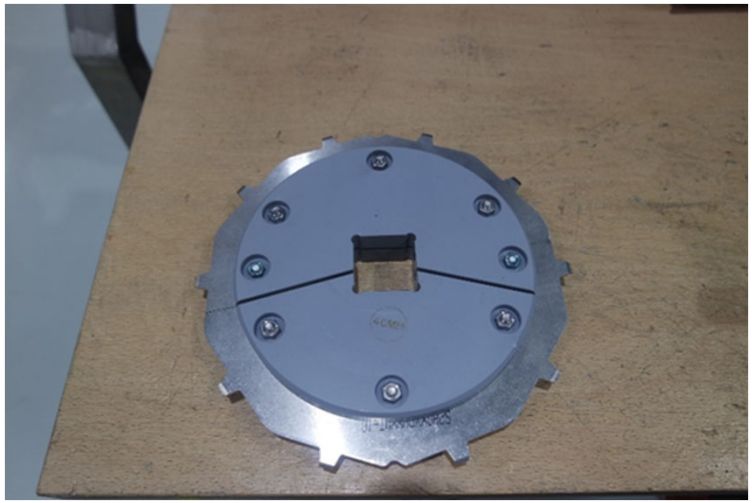
1. Use the feeler gauge in the corner of the sprocket bore to find the biggest wear.
2. The feeler gauge should be completely through the sprocket as showed in the picture.
3. Find a gauge that completely fills the gap between the sprocket bore and the shaft.
4. If the gap exceed 2 mm, all sprockets should be replaced.



5.2 Preventative Maintenance – Sprockets

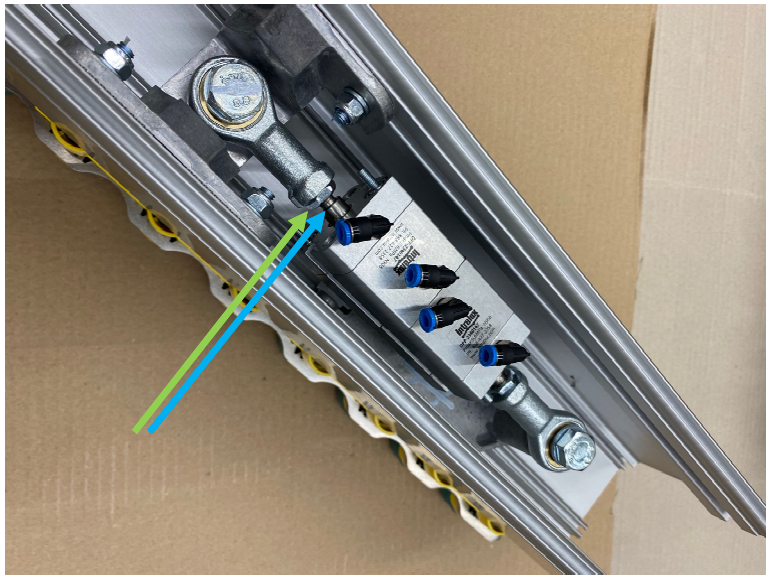
Sprocket replacement:

1. Open the belt. The shaft does not need to be removed to replace the split sprockets.
2. Remove the bolts from the split sprockets and remove them from the shaft.
3. Place the new sprockets in reverse order.
4. Place them at the same location as the original sprockets and make sure all teeth are correctly aligned (refer to User Manual for more details).



5.3 Maintenance –Rack and Roll

1. Zones set to zero position(pressurized with one cylinder in and one cylinder out)
2. Untighten the nut marked with the green arrow.
3. Turn the cylinder shaft marked with blue arrow CW/CCW to adjust the stroke
4. Don’t forget to tighten the nut after re-adjusting.



5.3 Maintenance – Service Position

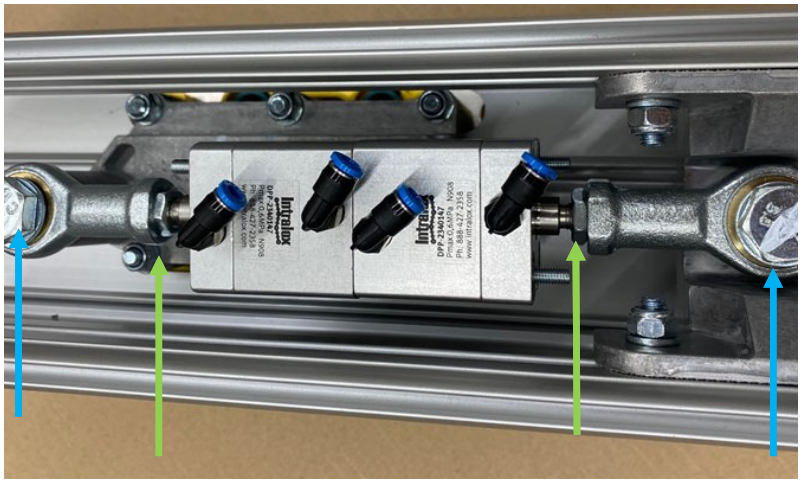
To reach service position the following steps should be executed:

- Remove the bolt out of the connecting bracket.(green arrow)
  - Be aware of the washer under the bolt and on top of the clevis head
- Pull the connecting bracket completely towards you.
- Now you have reach service position and rack and roll rollers can be taken out.

5.3 Maintenance – Changing cylinder assembly

If for some reason a cylinder assembly needs to be exchanged the easiest way to do is the following:

- Remove both the bolts (blue arrows) and disconnect the air tubes.
- Place the broken assembly on a table next to the new assembly.
- Measure the distance between at the nut on the broken assembly and copy this on the new assembly.



5.3 Maintenance Cleaning

- Depending on the overall dirtiness the conveyor belt should be opened and cleaned on regular base.
- When the conveyor is opened, observe for the following conditions:
  - Dirt / debris
  - Component wear
  - Missing / broken components

5.3 Preventative Maintenance

Debris causes rollers to not spin effectively anymore.

Example of belt wear, rollers do not effectively spin anymore.

Debris causes sprockets to no longer effectively engage with the belt.

5.3 Maintenance Cleaning

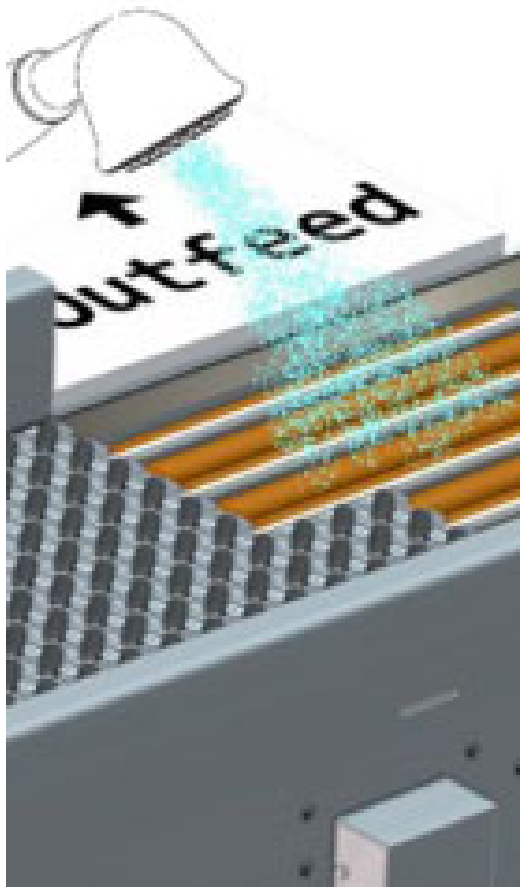
Cleaning is a critical part of preventive maintenance.

- Dry cleaning.
- Wet cleaning.

Always refer to the User Manual for details.

Certain Intralox solutions are washdown and have appropriate protection for the electrical components
Always use water wisely if needed

IMPORTANT: Consult Intralox for chemical use.

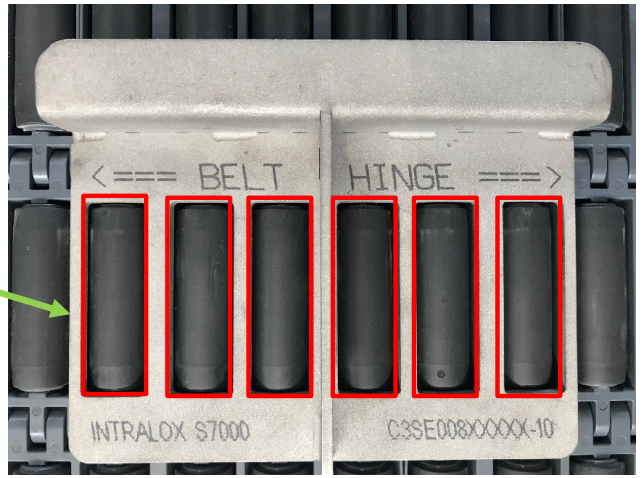


5.4 Tools for splitting the belt

For splitting the belt you need the following tools:

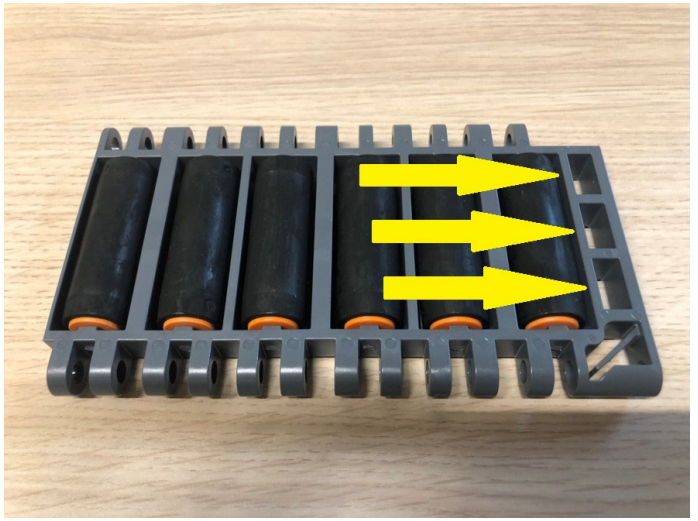
- Tensioner kit.
- Extra rod(s).
- Pair of safety working gloves.

Make sure that the belt rollers align with the holes in the belt puller.



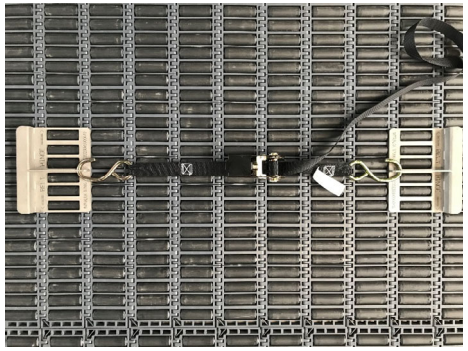
5.4 Tools for splitting the belt

This is an example of the type of belt holder that can be manufactured.

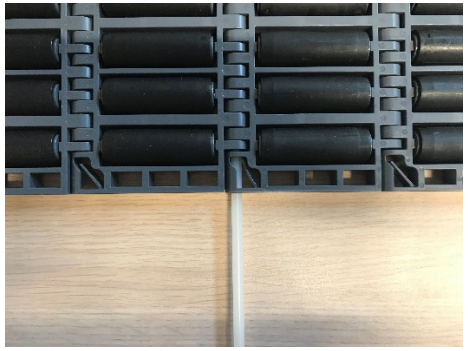


Secure the belt by placing a holder through one of these slots in the edge of the belt against the end frames on all 4 corners of the belt.

5.5 How to split the belt.

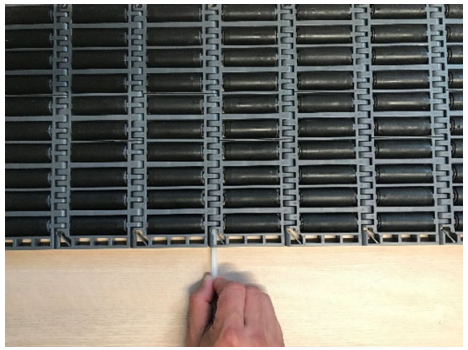


Insert the belt pullers in the belt and apply tension by using the ratched straps.



Open the “barn door”** by inserting a rod in to a edge module.

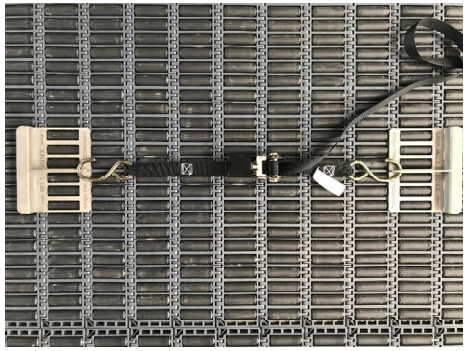
Push a second rod in the oposite edge module and press against the rod in the belt.



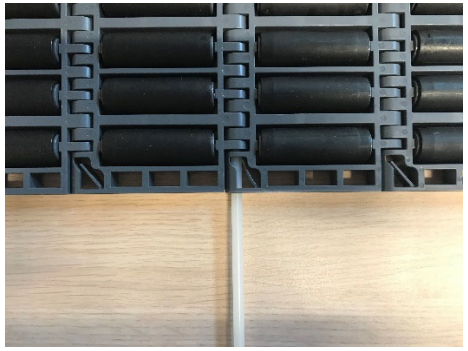
Pull out the rod.

5.6 Splitting the belts

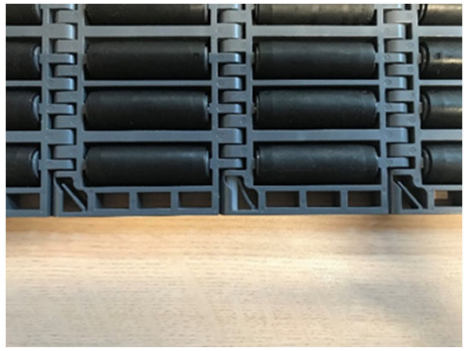
5.6 How to close the belt.



Insert the belt pullers in the belt and apply tension by using the ratched straps.



Press a rod into the belt.



Use a second rod to push the rod completly in the belt.

Make sure that the “barn” door is closed.

5.6 Closing the belt Considerations

- If the belt has been removed from the sprockets, ensure that all sprockets are properly engaged in the belt.
- Use belt puller kit to pull end of belt together, if necessary.
- Use spare rod to press new belt rod completely into belt.
  - Ensure new rod passes barn door and it closes fully.
  - Replace edge belt module if barn door feature is broken.

5.7 Troubleshoot

If an issue with Intralox equipment solution occurs

- Find User Manual, see chapters Maintenance a/o Troubleshoot.
- Grab tools & spares as needed.

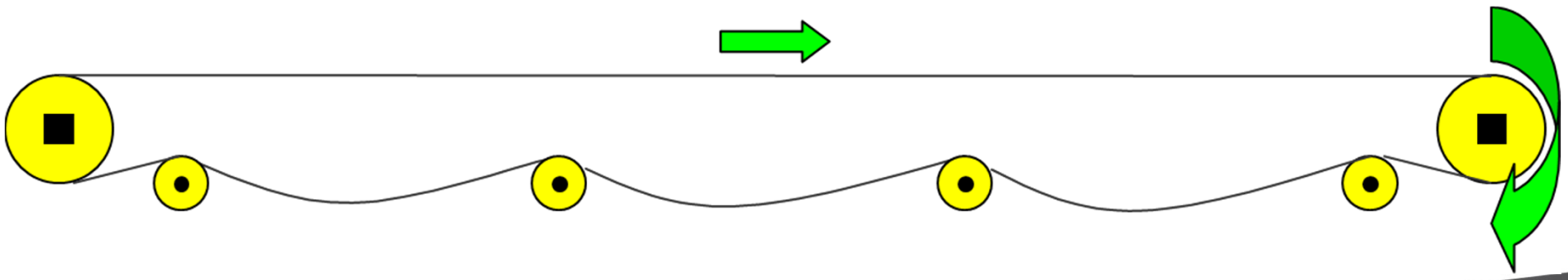
If you've tried everything to resolve

Call Intralox Customer Service with the following information.

- Intralox equipment number on type plate.
- Make photo's and/or video on smart phone for forwarding per mail.
- What you think may have caused it / what you've tried to resolve.

5.7 Troubleshoot– Knocking sound S7000

Due to the fact that we use square shafts in combination with square bore sprockets it can occur that we hear a “knocking” sound on the idle shafts of our machines.



Questions?

Thank You