

OPERATION & MAINTENANCE MANUAL

Buffer System
Project No #####

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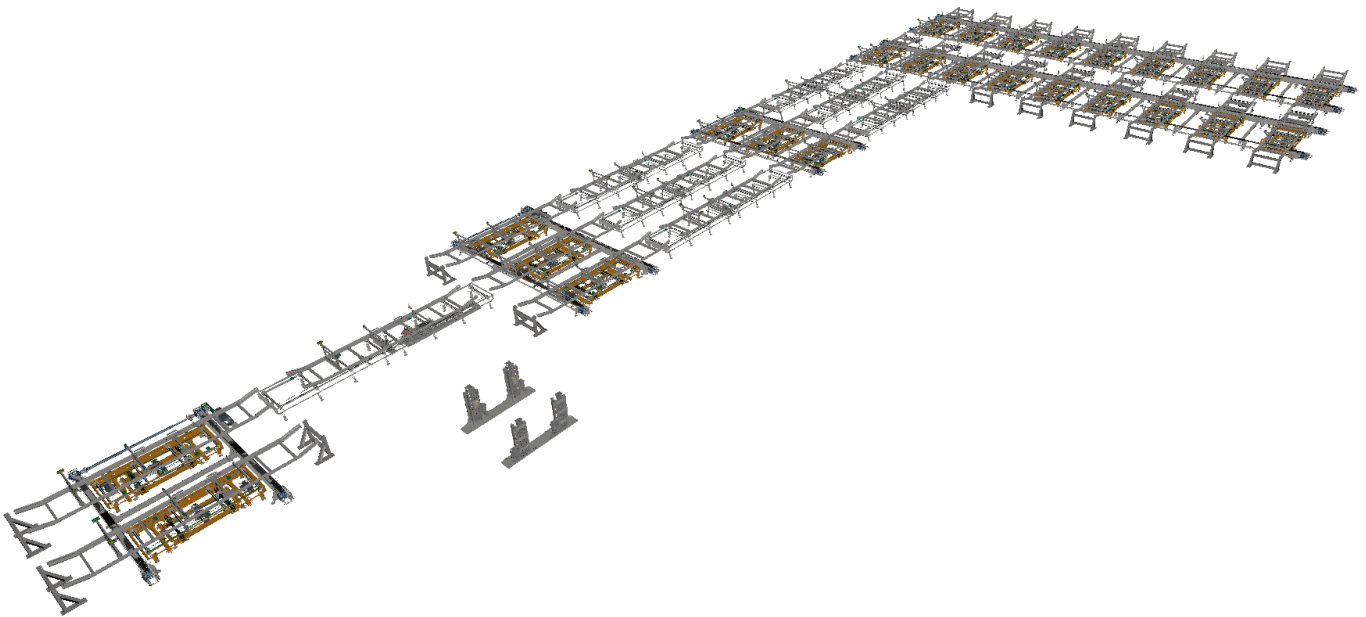
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1.0 GENERAL

Introduction to the ## Buffer System Bentley Crewe



*All the equipment & services have been supplied
by; Acme Corp.*

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The ## Buffer System is a self-contained zone within the paint shop. The purpose of the Buffer System is to provide a storage area for vehicles in the paint shop.

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1.1 SAFETY INSTRUCTIONS

1.2.1 Organizational measures

- It is the organisations responsibility to determine the level at which personnel are qualified to operate and/or maintain the equipment.

1.2.2 Selection and qualification of personnel – Basic responsibilities

- Only authorised persons who are familiar with the installation, or who have been trained and instructed for their tasks, and who are also familiar with current accident prevention and work safety practices and are familiar with this section on safety may work on the installation.
- The authority responsible for the installation must ensure that persons assigned to the plant work in a safety and hazard-conscious manner, considering the operating instructions and general safety regulations.
- Persons being trained, and still inexperienced but instructed persons, must be supervised by an experienced person.
- Within the working area, the operator and maintenance personnel are responsible for third parties.
- Responsibilities for the various tasks on the installation must be clearly defined and observed.
- The authority responsible for the installation must ensure that the relevant documentation is available to the operator and must make sure that the operator has read and understood it and will observe it in future.
- The participation in training sessions must be documented. It is also the duty of the authority responsible for the installation to ensure that the operator is re-instructed after technical changes. The operator must also be re-instructed by the responsible authority after safety-critical incidents.

1.2.3 Safety instructions governing specific lifetime phases

Safety devices used within the facility require replacing on a set frequency determined by the supplier to ensure the safety integrity of the system is maintained. It is the responsibility of the end user to ensure the system safety is reviewed on a regular basis.

Safety related parts of control systems are designed for a mission time of 20 years. Any items which have not already been replaced should be reviewed after 20 years operation.

1.2.4 Warning of specific danger



Electrical energy

- Work on electrical plant and equipment must only be carried out by a trained and qualified electrician.
- Loose connections, damaged or charred cables, and any suspect insulation must be replaced immediately. Repair defective measures intended to prevent accidental contact with live parts immediately. Before working on parts that have been live, discharge them to an earthed part of the plant. When working on live parts, it is essential that a second person is present to operate the main switch in an emergency.
- Except for measurement and testing, general safety regulations require that the power supply to a control cabinet is switched off when it is being worked on.
- Before working on electrical parts, check that they are really carrying no voltage. Keep control and connection boxes closed.
- Check electrical equipment in the plant every 3 months. When electrical equipment reaches the end of its service life or its age limit, it must be replaced as a preventive measure.
- If work on live parts is necessary, it is essential that a second person is present to operate the EMERGENCY STOP switch or main switch to disconnect the supply in an emergency. The second person must be familiar with resuscitation measures.
- Use only electrically insulated tools. The power supply to electrical push-on connectors must always be switched off before they are connected or disconnected.
- Never touch conductors or components of sub-assemblies that have been live, without first discharging them to an earthed part of the plant.



Hydraulic and pneumatic equipment

- Work on hydraulic and pneumatic equipment must only be carried out by a trained and qualified specialist.
- The safety and maintenance instructions and recommendations of the manufacturer of the relevant hydraulic or pneumatic component must be followed.
- Before working on hydraulic or pneumatic equipment, release any pressure in them.
- Even if there are no visible signs of damage, supply lines must be replaced at appropriate intervals.
- If hydraulic oil has to be drained, collect it in a suitable container. Treat pools of oil with a suitable binder and dispose of the used binder correctly (prior to disposal of oil, used binder, and oil-soaked cleaning cloths, keep them in suitable containers).
- Check hydraulic and pneumatic equipment every 3 months.
- Moving parts, that are not automatically fixed in one position when relieved of pressure, must be secured with suitable fixtures before entering the plant.

- When commissioning the plant, remember that valve spools can be in undefined positions – this can result in uncontrolled movements.
- When commissioning and after maintenance and repair work, check the tightness of screw connections that have been loosened. Make sure that reservoir covers, sieves and filters, which have been removed, are replaced.
- After completion of maintenance and repair work, and before resuming production, make sure that all materials, tools, and other equipment have been removed from the working areas of the plant, and that any fluids spilt have been cleaned up.

Noise



- The A-weighted equivalent continuous sound pressure level of the drive units employed in the system is below 70 dB(A). This value can increase due to special circumstances. In such a case, the authority responsible for the installation must inform the personnel and adopt appropriate protective measures.

Oil, grease and other chemical substances or other hazardous material

- Lubricants used are referenced in section 5, the lubricants are selected from a standard materials list. Please refer to the COSHH information held centrally on the specific lubricants recommended.

2.0 TERMS

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2.1 Terms

The terms used in this operation & maintenance manual are all authorised and current EU standard terms as at the time of compilation of the manual. All are compliant with EU Machinery directives.

See list below for detailed description of terms used throughout this operation & maintenance manual

Term	Description
FMEA	Failure mode effect analysis
COSHH	Control of substances hazardous to health
EU	European union
PRB	Powered roller bed
dB(A)	A-weighted decibels
PLC	Programmable logic controller
LOTO	Lock out Tag out

2.2 Original Instructions

The instructions within this manual have been written in English, and if translated should be transcribed to read, *Translation of Original instructions*

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3.0 DESCRIPTION & MAINTENANCE

3.1 GENERAL

3.1.1 Overview

The body is transferred overhead on the “Power and Free” conveyor into an auto-stop position above the 4 post stores lifter.

The 4 post stores lifter lifts the body to the correct height for the transfer onto the arms of the Springvale Envelope.

Prior to transfer of the body onto the stores skid, the AutoSecure clamp on the stores skid clamp assembly retracts/extends along the THK rails to a position dependent on the type of body to be located on the stores skid. Once in position, the AutoSecure clamp closes ensuring the stores skid is in the correct position on the PRB to receive the body.

The Springvale Envelope transfers the body onto the stores skid on the 8 roller stores PRB.

The stores skid containing the body can now be transferred to the required cross transfer for storage.

The cam lifter PRB in the selected cross transfer raises to receive the stores skid. The stores skid transfers along the PRB rollers until it reaches the selected cam lifter PRB. On receipt of the stores skid, the cam lifter PRB lowers providing a storage position for the stores skid and body.

2.1 FUNDAMENTAL SAFETY INSTRUCTIONS

3.2.1 Knowledge and keeping of the operating instructions



- Knowledge of the general safety instructions that are given in the manual is a basic requirement for handling and trouble-free operation of this system.
- All maintenance personnel must comply with the instructions given in the operating manual, paying attention to the safety instructions within.
- Furthermore, all local accident prevention rules and regulations must also be heeded.

3.2.2 Qualification of operating staff

- Only instructed personnel can operate the equipment, define clearly the responsibility of the personnel concerning operation.
- In the course of training, special emphasis should be placed on instructions about the hazards and required safety measures.
- This instruction must be repeated regularly, at least once a year.
- The responsibilities of the personnel for operation, setup and maintenance of the equipment must be clearly defined.
- Make sure only authorised personnel will operate the equipment.
- Appoint an equipment supervisor and define his responsibilities and allow him authority to refuse instructions from third parties if these are contrary to safe operation



Warning!

“ONLY AUTHORISED COMPETENT PERSONNEL TO PROGRAMME OR MAINTAIN THIS EQUIPMENT”

Instruction to warn that only trained maintenance engineers should be allowed access to the equipment and the manual operations for error Recovery or Maintenance.



Warning!

“COMPETENT OPERATORS MUST OBSERVE ALL SAFETY PROCEDURES”.

Warning that only trained and competent personnel should operate the cell and that all safety procedures should be observed.



Attention!

Only allow personnel undergoing training of any kind to work on the system under the constant supervision of an experienced person

Work on the electrical equipment of the plant must only be carried out by a qualified electrician or by duly instructed persons under the supervision of a qualified electrician, in accordance with electrical engineering rules and regulations.

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Personnel Activities	Instructed Personnel	Personnel with Technical Education	Personnel with Electro technical Education
Transport	X		
Start-Up			X
Setup		X	
Operation	X		
Troubleshooting and repairs on electrical and electronic components			X
Troubleshooting and repairs on mechanical components	X	X	
Maintenance on electrical and electronic components			X
Maintenance on mechanical components	X	X	
Repair		X	X

3.2.3 Hazards of operation

Electrical energy



Attention!

Work on the electrical equipment of the system may only be carried out by qualified electricians or by an instructed person being managed and supervised by a qualified electrician according to EU and PUWER regulations.

Proceed with extreme caution when dealing with electrical power.



Attention!

Before any work is carried out on the electrical equipment of the station, switch off the main switch and take suitable measures (e.g. lock it) to ensure it cannot be switched on.

If it cannot be locked for any reason, display a warning notice at the switch that reads: "Do not switch on! Work in progress in the danger zone! "

The employee who is responsible for carrying out the job(s) must keep the key on his person.

Inspect the system's electrical equipment at regular intervals. Tighten any loose connections and replace defective cables immediately.

The control cabinet must always be kept locked. Only duly authorized personnel who are entrusted with a key may have access to the control cabinet.

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Only use genuine fuses of the prescribed amperage.

If any problems arise in the electrical power supply, switch off the system immediately.



There is an immediate risk of fatal injury when working on live parts!

If you must work on live parts, make sure that a second person is present who can press the EMERGENCY STOP button or turn off the power at the main switch if an emergency should arise.

Cordon off the work area with a red-and-white safety chain and display a warning notice.

Only use power-insulated tools!

Pneumatic energy



Attention!

Only duly trained personnel may carry out work on pneumatic components of the system. The whole system must be depressurized, and measures must be taken to prevent the system from being switched back on again before any such work is done.



Warning!

Caution! On controlled entry to the cell, mechanisms may still be in an active state!

On controlled entry to the Cell, air is retained to maintain the status of the equipment, but personnel must be aware that there is stored energy and take the appropriate action to maintain safety.



Attention!

When working on the pneumatic equipment of the system, depressurize the system by hand (disconnect the compressed air from the compressed air service unit).



Warning!

Exercise caution when restoring the system!

Crushing injuries may be sustained when pressure is reapplied to the cylinders during the re-start up process. Therefore, it is imperative that all safety devices are restored first and that there are no personnel or objects in the work envelope.

Laser hazard



Attention!

Only duly trained personnel may carry out work on the system when the UV Lights are still active.



**Caution
UV Light**

“CAUTION – UV LIGHT”.

UV Safety Glasses provided at the access gate area should always be used to allow programming personnel to use the system in teach mode for a minimal adjustment. Full Face Mask, Overalls and Nitrile Gloves should be worn for any extended periods in the cell when the UV lights are operable.

Noise hazard

The plant is state of the art with regards to noise reduction technology
The continuous sound pressure level of the cell is 70 dB(A) coasting at maximum speed of movement.



*Ear defenders are recommended for noise levels
> 80 dB(A) and are mandatory for noise levels
> 85 dB(A).*

Regular training courses must be held in which personnel are informed that failure to wear ear defenders can lead to permanent hearing impairment or hearing loss.

3.2.4 EMC conformity

This is a fixed installation which has been assessed to be in conformity with the requirements of EMC Directive 2014/30/EU. The electrical system of this installation has been designed in accordance with equipment suppliers EMC installation recommendations and good EMC practice. Any repairs or modifications to the system must restore it to its original state or the EMC implications of the changes should be assessed to ensure conformity is maintained.

3.3 DESCRIPTION OF THE COMPONENTS

3.3.1 General system

- Description

The ## Buffer System provides a storage area for vehicle bodies on a stores skid clamp in one of the five cross transfers.

- Technical Data

- 5 cross transfers
- 26 storage positions

- Maintenance

See section 3.6 for specific maintenance instructions

3.3.2 System component specific description

- Description

The 8 types of equipment which make up the ## Buffer System are detailed below:

4 POST STORES LIFTER

4 ROLLER MULSANNE PRB

8 ROLLER STORES PRB

CAM LIFTER PRB

CROSS TRANSFERS

- Short
- Medium
- Long

SINGLE ROLLER STORES PRB

STORES SKID CLAMP

SPRINGVALE ENVELOPE

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Drive Schedule

AREA	DESCRIPTION	Qty.	Conveyor Speed (m/s)	Power (kW)	SEW EURODRIVE Model	RPM	Output Torque (Nm)	Mounting	Terminal Box (°)	Cable Entry	Voltage (V)	Frequency (Hz)	Full Load Current (A)	Brake	Brake Voltage (V)	Brake Location (°)	MOTOR PROTECTION
Buffer System	Powered Roller Bed	7	0.38	0.37	R27 DRS71S4/BE05/HR/TF/IS	56	63	M1	180	3	400	50	1.14	YES	400	213	IP54
	Single roller PRB	9	0.38	0.37	R27 DRS71S4/BE05/HR/TF/IS	56	63	M3	180	3	400	50	1.14	YES	400	213	IP54
	Cam Lifter Rollers	26	0.38	0.37	R27 DRS71S4/BE05/HR/TF/IS	56	63	M3	180	3	400	50	1.14	YES	400	213	IP54
	Cam Lifter	26		0.75	R67 DRE80M4BE1HF/IS/TH	17	430	M1	180	X	400	50	1.75	YES	400	303	IP54
	Cross Transfer	5	0.19	2.2	S77 DRN100LS4/BE5/TF/IS/LN	17	910	M1	270	X	400	50	4.85	YES	400	N/A	IP55
Mulsanne Insertion	Powered Roller Bed (inc. shuttle PRBs)	2	0.38	0.37	R27 DRS71S4/BE05/HR/TF/IS	56	63	M1	180	3	400	50	1.14	YES	400	213	IP54
	Single roller PRB	0	0.38	0.37	R27 DRS71S4/BE05/HR/TF/IS	56	63	M3	180	3	400	50	1.14	YES	400	213	IP54
	Shuttle Conveyor c/w Shuttle	1	0.25	0.37	K47DRS71S4BE05/HR/TF	24	146	M1	0	X	400	50	1.14	YES	400	303	IP54
Springvale Unit	Fork Drive	1	TBC	0.06/0.25	R37 DRS71S8/2BE05/IS/TF/Z	7.5/32	200	TBC	TBC	TBC	400	50	0.97	YES	400	TBC	IP54
	Cam Lift Drive	1	TBC	2.2	K37 DRN100LS4/BE5/IS/TF	213	150	TBC	TBC	TBC	400	50	4.75	YES	400	TBC	IP54
	Cam Lift Bevel	2	TBC	N/A	K97 AD3	20	4300	TBC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

19-1704 Proxy Schedule

AREA	DESCRIPTION	Control	Qty.	Conv #	P&F Proxy Part No NCB50-FP-E2-P1-V1			P&F Proxy Part No NB820-L2-A2-V1		
					Slow Down PX	Stop PX	Check PX	Bottom PX	Mid PX	Top PX
Buffer System	Powered Roller Bed	INV	7		2	2	0	0	0	0
	Cam Lifter Rollers	INV	26		2	2	0	0	0	0
	Cam Lifter	DOL	26		0	0	0	1	1	1
	Cross Transfer (9 lanes)	INV	2		9	9	9	0	0	0
	Cross Transfer (3 lanes)	INV	2		3	3	3	0	0	0
	Cross Transfer (2 lanes)	INV	1		2	2	2	0	0	0
Mulsanne Insertion	Powered Roller Bed	DOL	2		0	1	1	0	0	0
	Shuttle Conveyor c/w Shuttle	INV	1		0	0	0	2 (slow)	2 (stop)	0
Springvale Unit	TBC									
	TBC									
	TBC									
XS112B3PAM12										
					Open	Close		Home	Pos.1	Pos.2
X-clamp	X-Clamp		1		1	1	0	1	1	1

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3.4 INSTALLATION / DEMOUNTING / TRANSPORT

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Installation / demounting / Transport has been carried out by Acme Corp System (UK). Any changes to the ‘As delivered’ installed should be conducted in consultation with, or, by Acme Corp System (UK).

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3.5 SAFETY EQUIPMENT

3.6 MAINTENANCE & CARE

3.6.1 Safety instructions for maintenance and care

Preventative maintenance



Warning!

Maintenance must only be carried out by duly authorized and qualified personnel in compliance with the maintenance manual and all applicable accident prevention regulations.

Failure to heed this warning could result in bodily injury or major material damage!

The following safety measures must be taken:

- Read the chapter “Safety Instructions “.
- Switch off the power and utilities and take suitable measures to prevent them from being accidentally switched back on again.
- Make sure that no voltage and no pressure are present.
- Cordon off the assembly area.
- Protect or put cushioning up at sharp edges/corners of the station.
- Use suitable tools and pay attention to the tightening torques.
- Do not put dismantled parts down on edges, trusses, or oily surfaces (risk of them falling).
- Use only non-caustic and non-gassing cleansers.
- Make sure that the lubricants, solvents or cleaning agents cannot spill.
- Dispose of all packaging and exchanged parts in accordance with the applicable regulations.
- Do not leave any equipment parts or tools inside the system.
- Do not used damaged replacement parts.
- Always follow all safety instructions.
- Before switching the equipment back on, make sure that all tools and maintenance materials have been removed from the area and that there is nobody inside the safety enclosure. Check that all safety devices are in full working order.

Safety of persons and machines



Attention!

Before carrying out any maintenance or repair tasks, the equipment must be switched off completely and suitable measures must be taken to ensure that it cannot accidentally be switched on:

Turn off the main switch and remove the key. The person carrying out the maintenance or repair task should keep this key on his person

Before commencing the maintenance or repair task, clean the station, the connections and screwed fittings, to remove all dust and dirt.

Post cleaning inspect all screwed connections for any signs of leaks, chafe marks, damage and tightness. Rectify any shortcomings immediately.

Always remember to tighten any screwed connections that may have been loosened in the course of the maintenance and repair task.

If any safety devices have to be removed whilst carrying out maintenance and repair task, they must be reinstalled and checked for correct functioning immediately after the maintenance and/or repair task(s) have been completed.

Always dispose of consumables and exchanged parts in an environmentally friendly manner.

3.6.2 Cleaning the system

Useful tools:

- Industrial vacuum

Initial conditions:

- Stop the machinery
- Disconnect electrical power supply
- Discharge pneumatic and hydraulic pressure

Safety conditions:

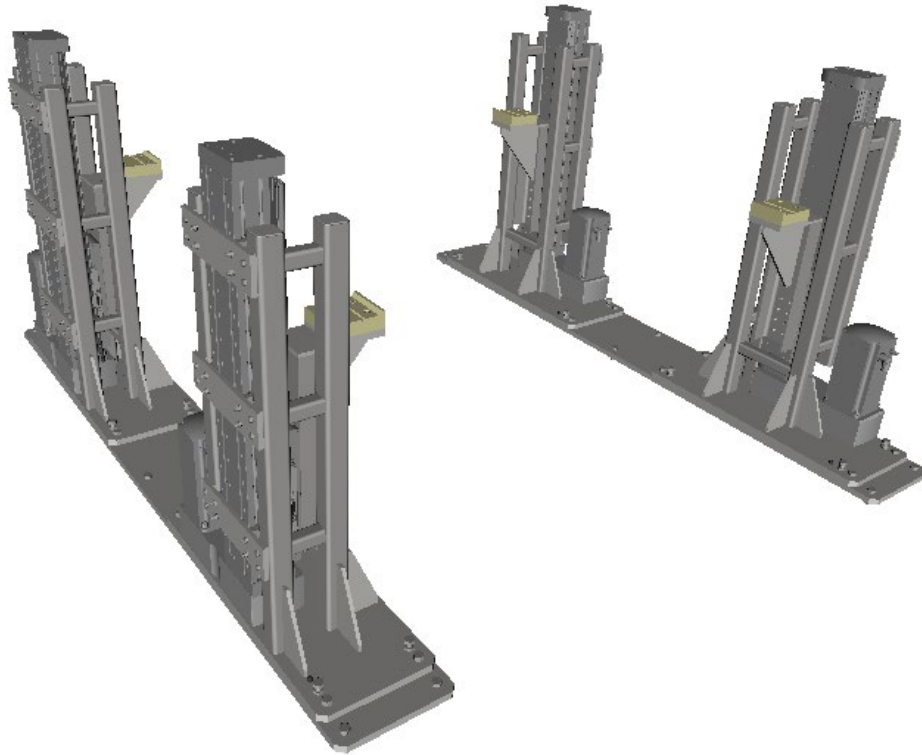
- Keep a fortress access key in your pocket during all operations
- Lock the manual valve lever and keep the key
- Use suitable PPE

Procedure:

- We recommend to clean and remove any dropped parts from within the cell and load areas

3.6.3 Maintenance Checks

Equipment	Description
19-####-507-00-00	4 Post Stores Lifter – Daily Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

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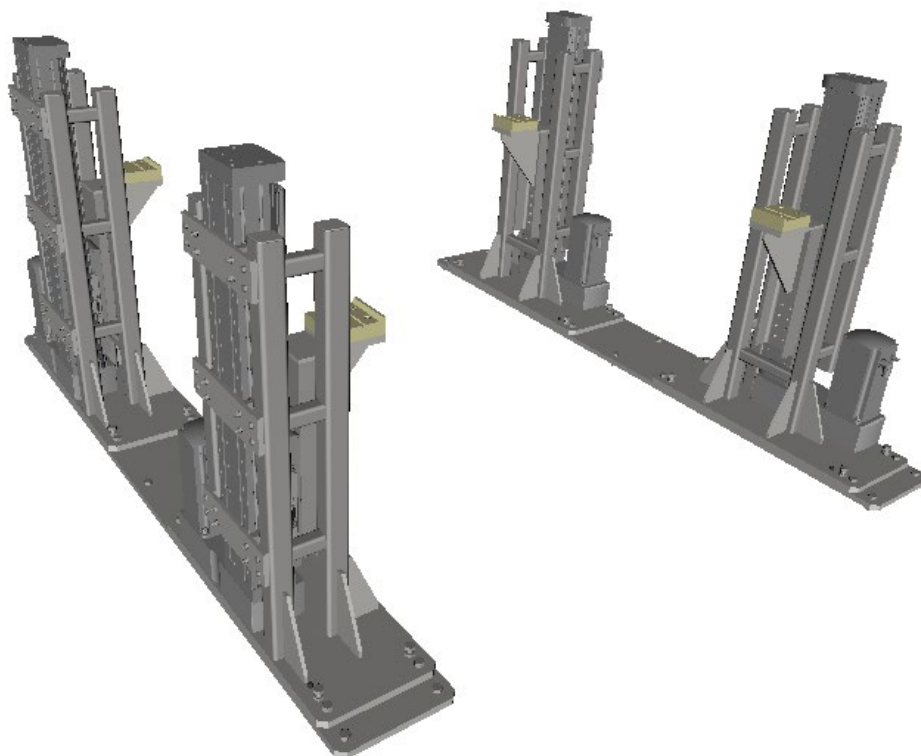
Procedure

Step	Task
10	A daily walk through inspection while the lifter is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, dry slides on the spindle axis and general cleanliness.
30	Listen for noises from the body lifters and any vibrations.
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the lifter when the beam and/or presents is blocked and/or sensed. If the lifter does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment, replace it.
60	Make sure all Access Gates function are operating correctly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

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Equipment	Description
19-####-507-00-00	4 Post Stores Lifter – 200hrs Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

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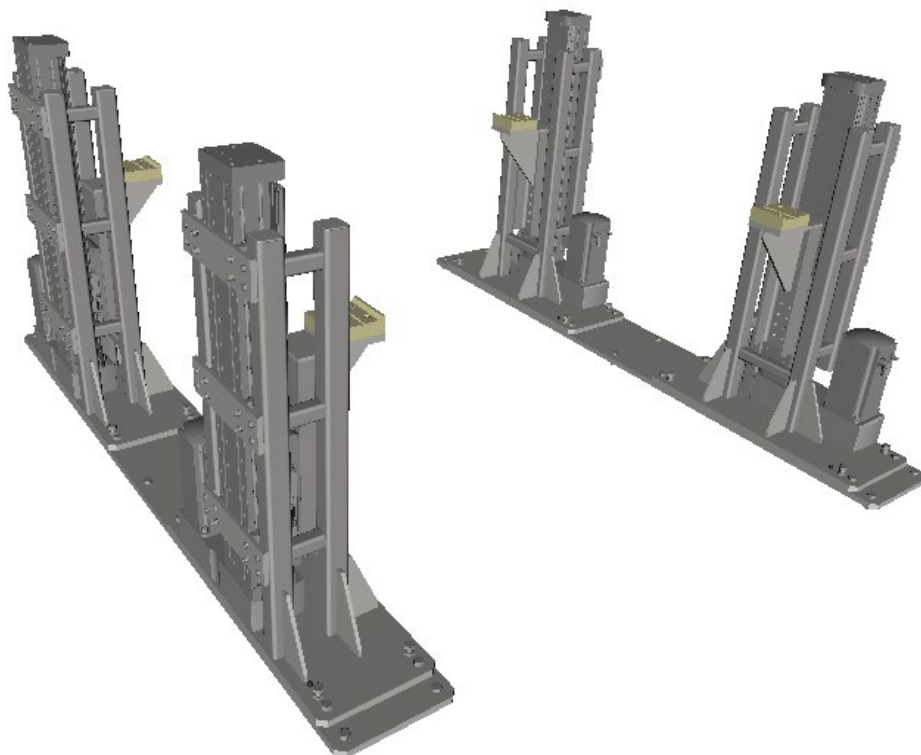
Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the lifters for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the lifters during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor as necessary.
30	Check the servo motor current draw under loaded operating conditions.
40	Check the slides mounting fixings (bolts) are tight. Tighten and replace any missing fixings as necessary
50	Check the lifter contact pads and ensure the fixings are tight and secure. Tighten as necessary.
60	Check that all sensors are aligned, tight and secured. Tighten as necessary
70	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

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Equipment	Description
19-####-507-00-00	4 Post Stores Lifter – 600hrs Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the body lifters that could interfere with the lifter operation. Use a wire brush, do not use a water base solution on the lifters.
20	Inspect the spindle axis slides for excessive wear and damage. Make sure that the slides operate smoothly and quietly. If a noise emits from the slides or it does not operate smoothly, is damaged or worn, replace it immediately.
30	Check slides are secure within their mounting. Tighten mounting bolts as necessary.
40	Inspect the slides for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the slides or on electrical devices or the motor. Wipe dry when finished.
50	Inspect the lifter contact pads for any damage, loose fittings and worn surfaces. Replace any pads that show any damage as noted above.
60	Check the lifters in operation and measure the lifter position to confirm that the lifters are operating simultaneously. If any defects are found, check the encoder on each post.

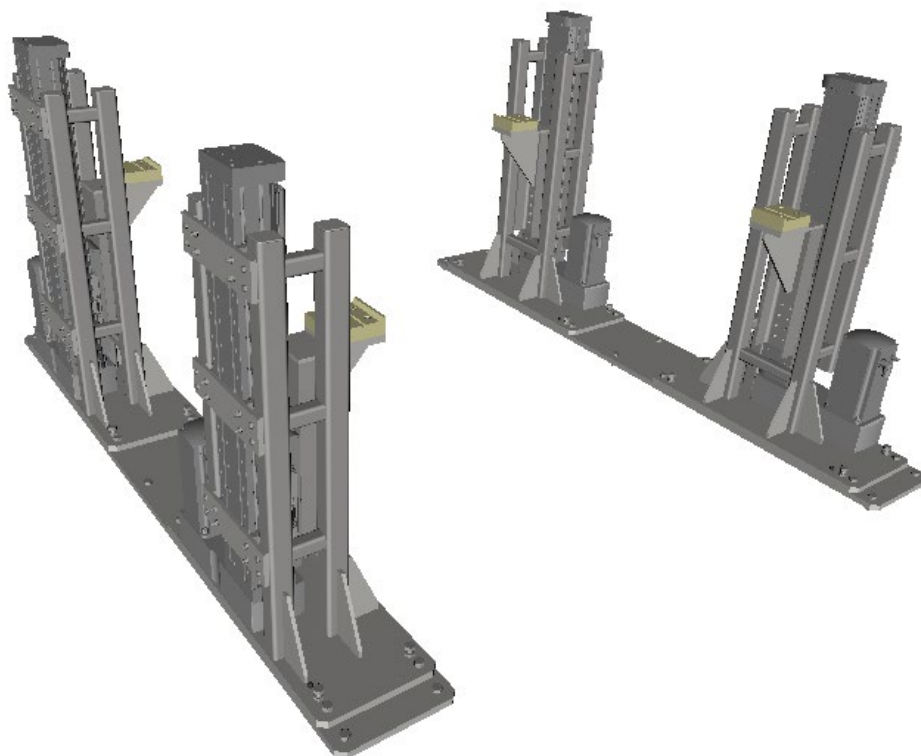
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Equipment	Description
19-#####-507-00-00	4 Post Stores Lifter – 2000hrs Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

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Procedure

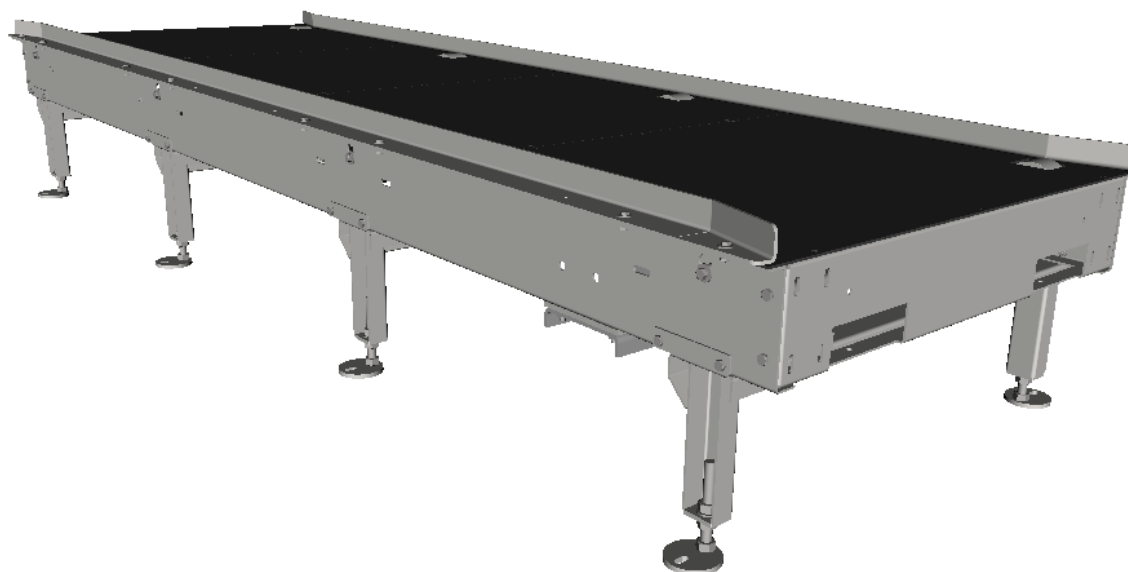
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate slides with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease slides.

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Equipment	Description
19-####-408-00-00	4 Roller Mulsanne PRB – Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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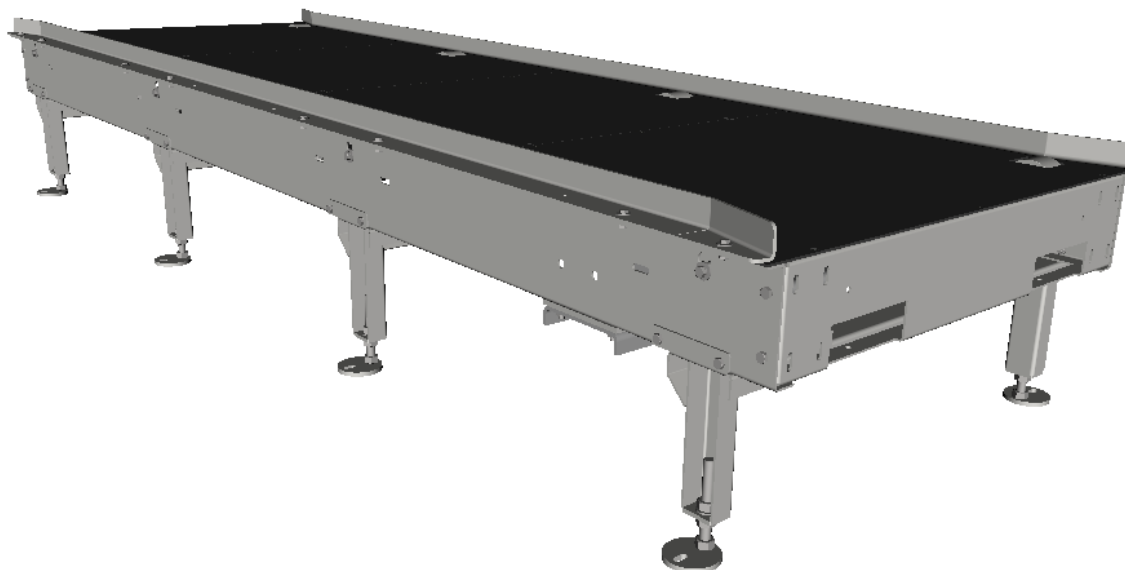
Procedure

Step	Task
10	A daily walk through inspection while the PRB is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belts, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the PRB / system when the beam and/or presents is blocked and/or sensed. If the PRB / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-408-00-00	4 Roller Mulsanne PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.
40	Check the fixed stops ensure the fixings are tight and anchors are secure. Tighten as necessary.
50	Check the rubber stop is in good condition, replace as necessary.
60	Check that all sensors are aligned, tight and secured. Tighten as necessary.
70	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

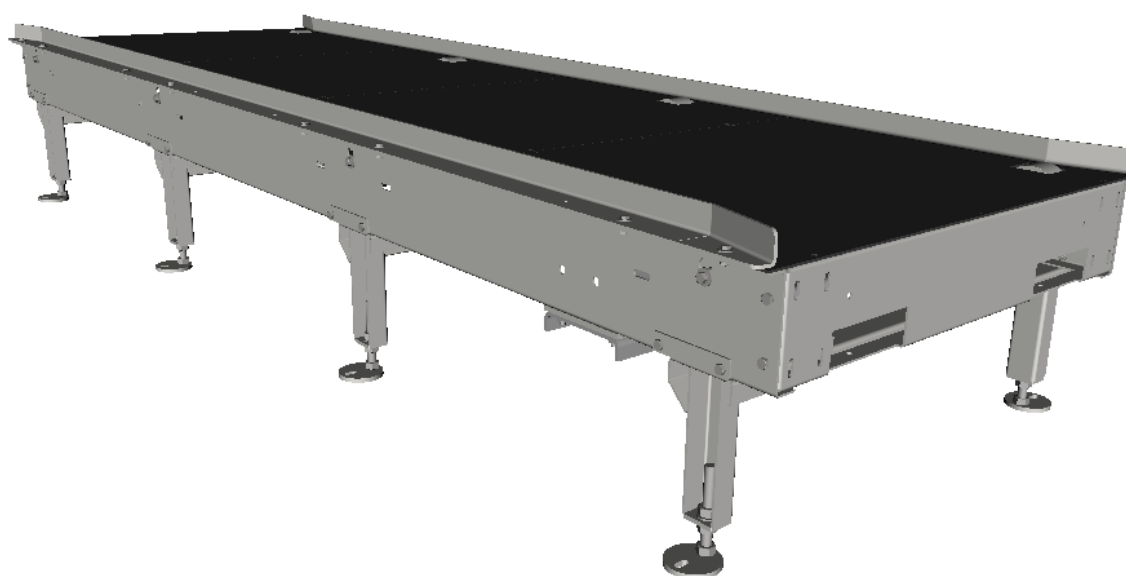
demo

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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-408-00-00	4 Roller Mulsanne PRB – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the brake release cable is tensioned correctly. Re-tension if required.
40	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
50	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
60	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devises or the motor.
70	Check the belt tension while the conveyor is operating under load. Look for any slippage on the pulleys. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
80	Check the belt tracking on both the drive and driven pulleys while the conveyor is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
90	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
100	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
110	Inspect the rollers for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devises or the motor. Wipe dry when finished.
120	Inspect the carrier rollers for any damage, bent shaft broken welds, worn surfaces. Replace any rollers that show any damage as noted above.
130	Inspect carrier rollers with sealed or unsealed bearings for freedom of movement. Rollers that do not spin freely must be replaced immediately. Note: A small amount of spray on lubricant at each end of the roller axle (shaft) may temporarily extend the life of the roller, but the roller should be replaced as soon as possible.

demo	Revision 1
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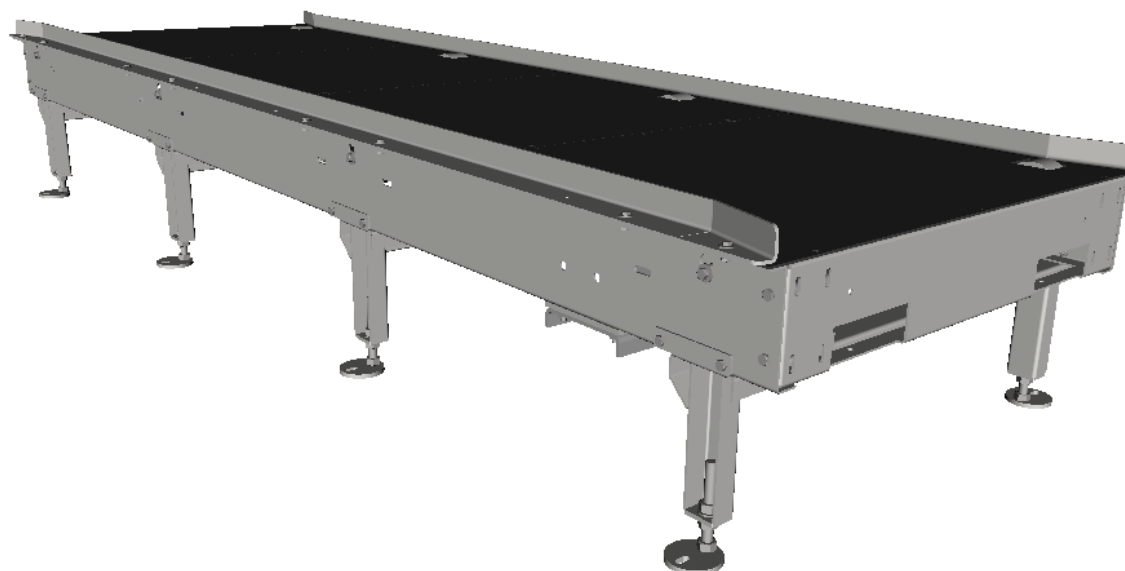
	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Step	Task
140	Inspect the wheels for cleanliness and damage. Clean with soap and water, wipe dry when finished. If damaged replace immediately.
150	Check wheels for delamination or uneven wear, replace as necessary.
160	Check the wheel mounting fixings (bolts) are tight. Tighten and replace any missing fixings as necessary.
170	Check the mounting is secure, tighten as necessary.
180	Check the rotation of the latch, ensure that it swings freely, lubricate as necessary.
190	Check the PRB in operation under load and not under load, listen for any noises or note other observations where the PRB does not operate smoothly.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-408-00-00	4 Roller Mulsanne PRB – 2000hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

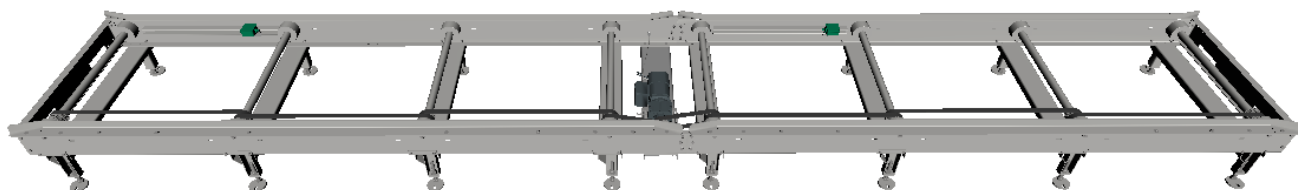
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-404-00-00	8 Roller Stores PRB– Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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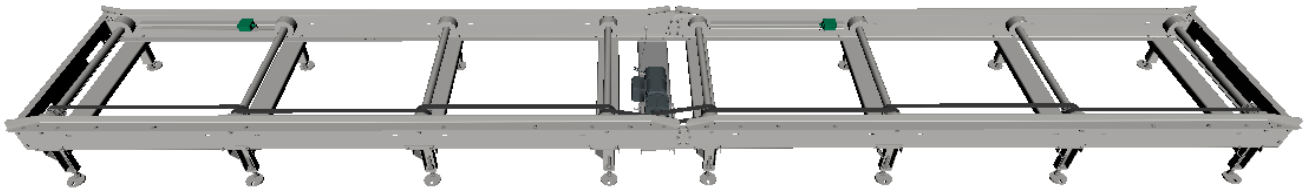
Procedure

Step	Task
10	A daily walk through inspection while the PRB is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belts, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the PRB / system when the beam and/or presents is blocked and/or sensed. If the PRB / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-404-00-00	8 Roller Stores PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.
40	Check the fixed stops ensure the fixings are tight and anchors are secure. Tighten as necessary.
50	Check the rubber stop is in good condition, replace as necessary.
60	Check that all sensors are aligned, tight and secured. Tighten as necessary.
70	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

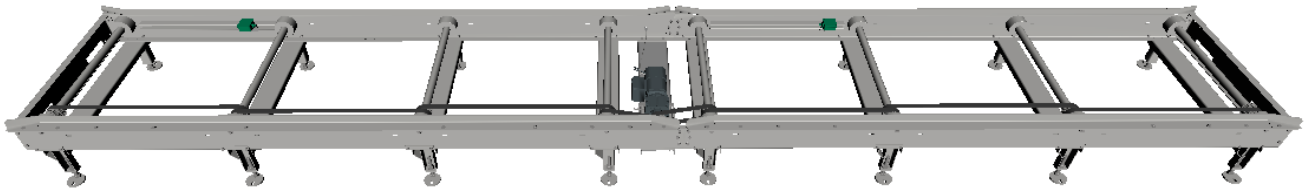
demo

Revision 1

O & M

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-404-00-00	8 Roller Stores PRB – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the brake release cable is tensioned correctly. Re-tension if required.
40	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
50	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
60	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devises or the motor.
70	Check the belt tension while the conveyor is operating under load. Look for any slippage on the pulleys. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
80	Check the belt tracking on both the drive and driven pulleys while the conveyor is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
90	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
100	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
110	Inspect the rollers for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devises or the motor. Wipe dry when finished.
120	Inspect the carrier rollers for any damage, bent shaft broken welds, worn surfaces. Replace any rollers that show any damage as noted above.
130	Inspect carrier rollers with sealed or unsealed bearings for freedom of movement. Rollers that do not spin freely must be replaced immediately. Note: A small amount of spray on lubricant at each end of the roller axle (shaft) may temporarily extend the life of the roller, but the roller should be replaced as soon as possible.

demo	Revision 1
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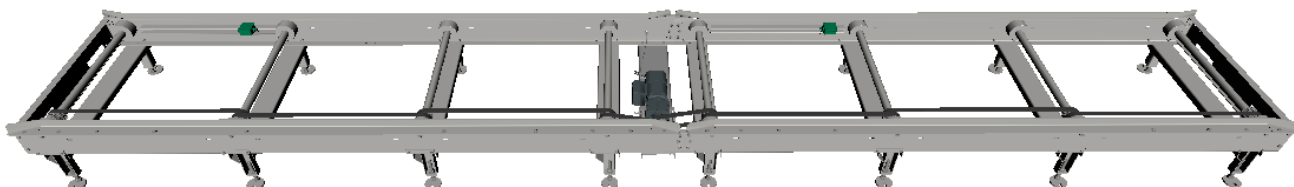
	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Step	Task
140	Inspect the wheels for cleanliness and damage. Clean with soap and water, wipe dry when finished. If damaged replace immediately.
150	Check wheels for delamination or uneven wear, replace as necessary.
160	Check the wheel mounting fixings (bolts) are tight. Tighten and replace any missing fixings as necessary.
170	Check the mounting is secure, tighten as necessary.
180	Check the rotation of the latch, ensure that it swings freely, lubricate as necessary.
190	Check the PRB in operation under load and not under load, listen for any noises or note other observations where the PRB does not operate smoothly.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-404-00-00	8 Roller Stores PRB– 2000hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

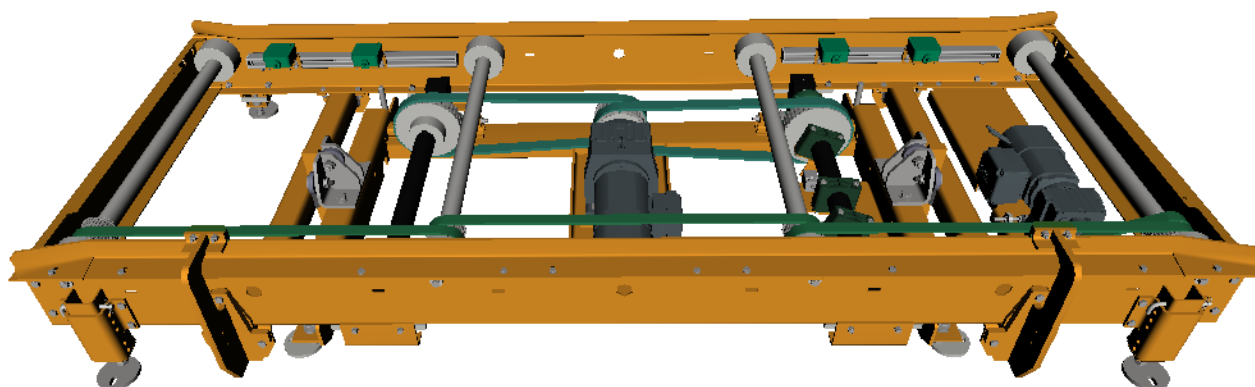
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-402-00-00	Cam Lifter PRB – Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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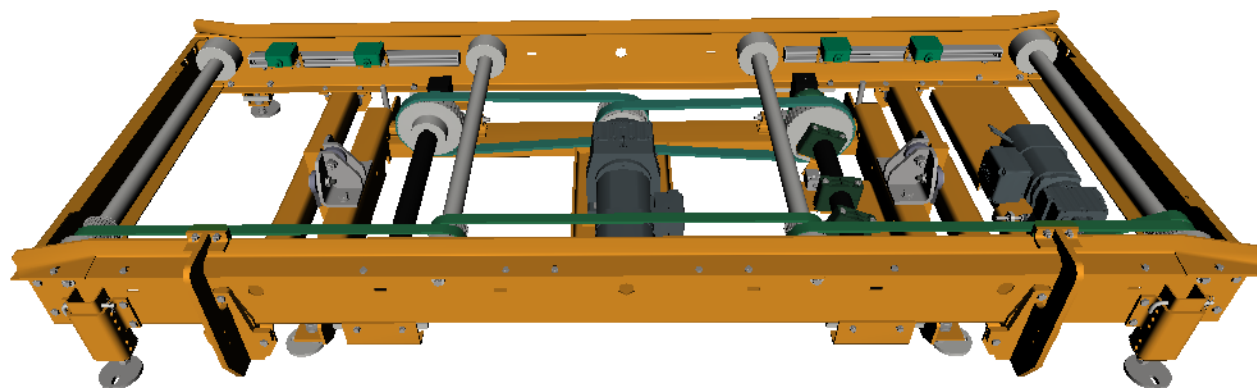
Procedure

Step	Task
10	A daily walk through inspection while the Cam Lift is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belts, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the Cam Lift / system when the beam and/or presents is blocked and/or sensed. If the Cam Lift / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-402-00-00	Cam Lifter PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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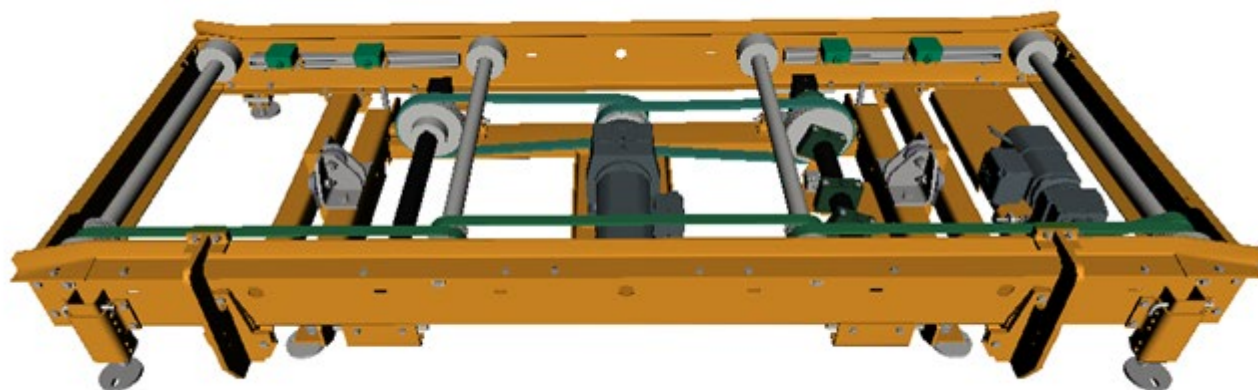
Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.
40	Check that all sensors are aligned, tight and secured. Tighten as necessary.
50	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-402-00-00	Cam Lifter PRB – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the brake release cable is tensioned correctly. Re-tension if required.
40	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
50	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
60	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devices or the motor.
70	Check the belt tension while the conveyor is operating under load. Look for any slippage on the pulleys. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
80	Check the belt tracking on both the drive and driven pulleys while the conveyor is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
90	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
100	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
110	Inspect the rollers for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devices or the motor. Wipe dry when finished.
120	Inspect the carrier rollers for any damage, bent shaft broken welds, worn surfaces. Replace any rollers that show any damage as noted above.
130	Inspect carrier rollers with sealed or unsealed bearings for freedom of movement. Rollers that do not spin freely must be replaced immediately. Note: A small amount of spray on lubricant at each end of the roller axle (shaft) may temporarily extend the life of the roller, but the roller should be replaced as soon as possible.

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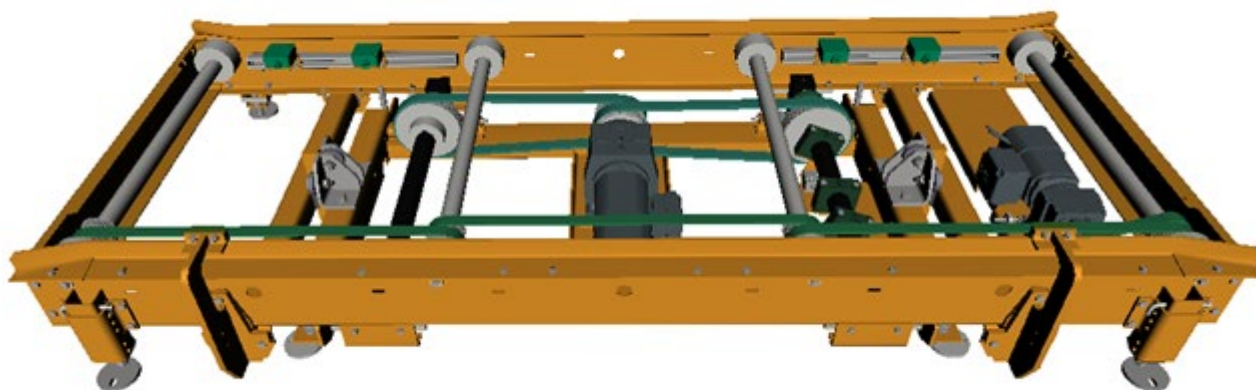
	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Step	Task
140	Inspect the wheels for cleanliness and damage. Clean with soap and water, wipe dry when finished. If damaged replace immediately.
150	Check wheels for delamination or uneven wear, replace as necessary.
160	Check the wheel mounting fixings (bolts) are tight. Tighten and replace any missing fixings as necessary.
170	Check to the Cam Lift in operation under load and not under load, listen for any noises or note other observations where the Cam Lift does not operate smoothly.
180	Check Gravity Latch rotates and is secure, tighten and adjust as necessary

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-402-00-00	Cam Lifter PRB– 2000hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

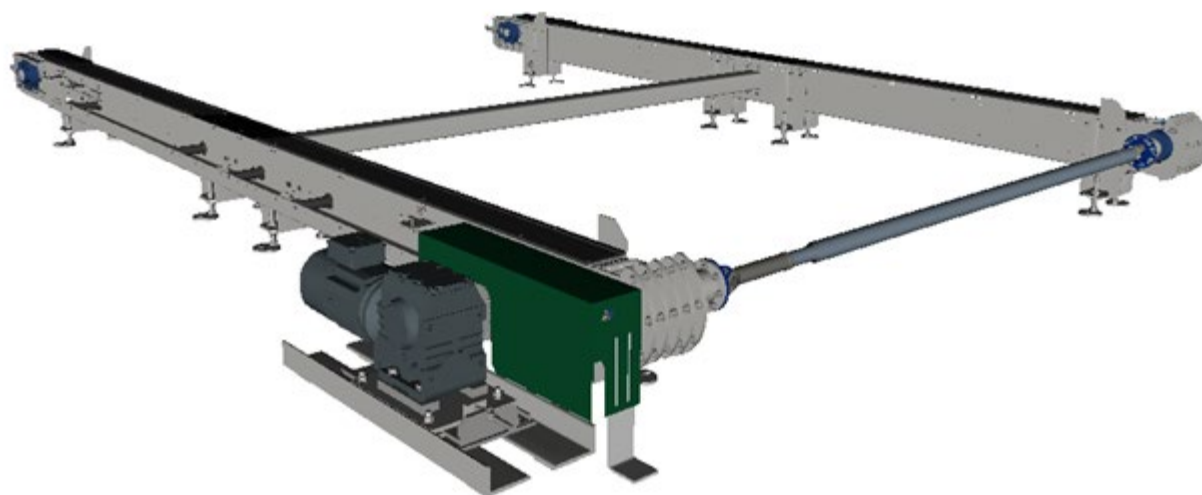
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-0601-00-0000	Cross Transfers – Daily Checks
19-####-0601-00-0001	
19-####-0601-00-0002	



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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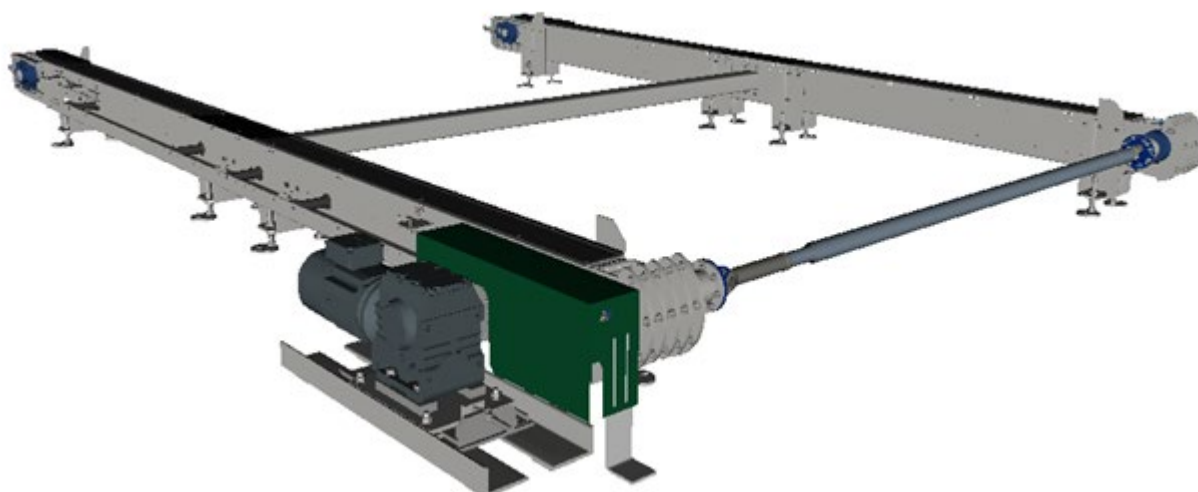
Procedure

Step	Task
10	A daily walk through inspection while the Cross Transfer is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belts, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the Cam Lift / system when the beam and/or presents is blocked and/or sensed. If the Cam Lift / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-0601-00-0000	Cross Transfers – 200 Hour Checks
19-####-0601-00-0001	
19-####-0601-00-0002	



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

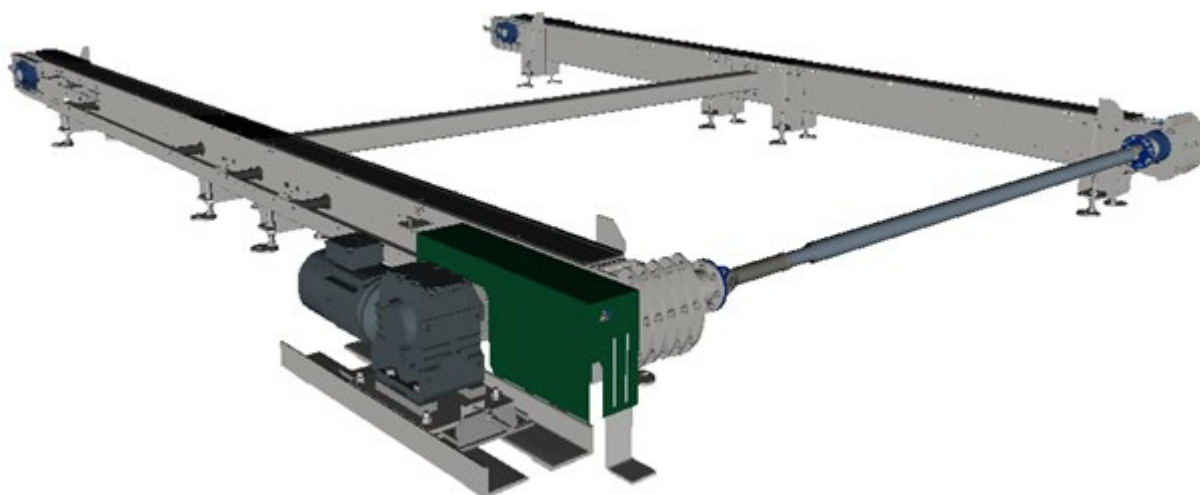
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.
40	Check that all sensors are aligned, tight and secured. Tighten as necessary.
50	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-0601-00-0000	Cross Transfers – 600hrs Checks
19-####-0601-00-0001	
19-####-0601-00-0002	



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the brake release cable is tensioned correctly. Re-tension if required.
40	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
50	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
60	Clean and lubricate drive chain. Clean drive chains using a wire brush and suitable solvent. Lubricate the chains lightly between the link plate edges using a SAE 20 motor oil or a good quality spray lubricant – Tygris Industrial R220 Chain and Wire lubricant.
70	Check the drive chain tension. Make sure the chains have 12mm to 24mm of slack at the mid-point between the sprockets.
80	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devices or the motor.
90	Check the belt tension while the conveyor is operating under load. Look for any slippage on the pulleys. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
100	Check the belt tracking on both the drive and driven pulleys while the conveyor is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
110	Check the drive prop shaft fasteners are tight, tighten as necessary.
120	Check the rotation of the prop shaft is concentric and not wobbling, check the drive shafts are secure and not damaged, re-align as necessary
130	Check the sprockets are engaging the conveyor chain correctly and are not jumping teeth, Replace as necessary
140	Check the drive shaft is not wobbling, check bearings are tight and aligned, replace bearing or tighten as necessary
150	Check chain finger guards are not binding on the conveyor chain, re-adjust and tighten as necessary
160	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from thee bearing or does not operate smoothly, is damaged or worn, replace it immediately.

demo	Revision 1
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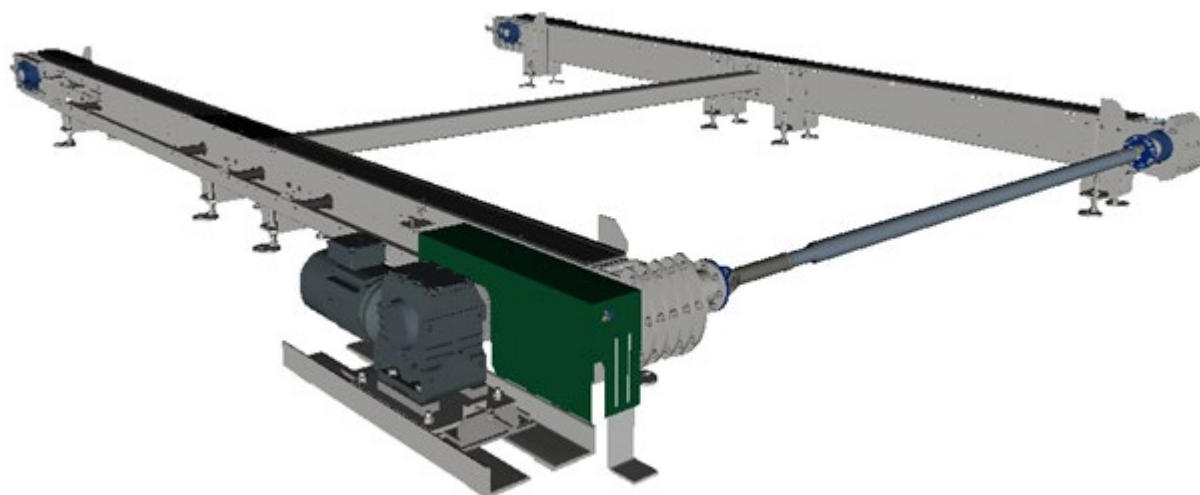
	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Step	Task
170	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
180	Inspect the cross transfer chain for any damage or deep grooves cut in the underside of the chain. Replace the link as necessary
190	Inspect the chain for loose or damaged links/pins, replace as necessary
200	Check the chain tracking, ensure that the chain is not tracking to one side and follows the track
210	Check the chain tracking on the return rollers ensure the chain is not tracking off the rollers
220	Inspect the return rollers for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devises or the motor. Wipe dry when finished.
230	Check the cross transfer in operation under load and not under load, listen for any noises or note other observations where the cross transfer does not operate smoothly.
240	Check Gravity Latch rotates and is secure, tighten and adjust as necessary

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-0601-00-0000	Cross Transfers – 2000hrs Checks
19-####-0601-00-0001	
19-####-0601-00-0002	



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

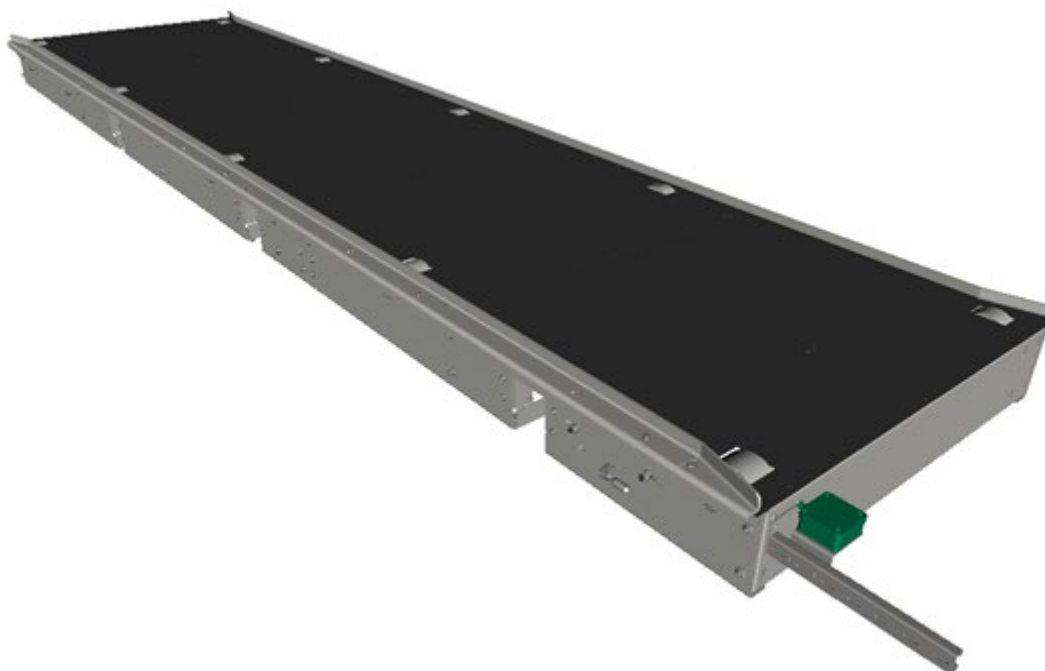
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.
20	Check the chain tension, the chain is not jumping the tension or drive sprockets, the chain is not surging, adjust tension as necessary.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-405-00-00	Existing Shuttle Mounted PRB – Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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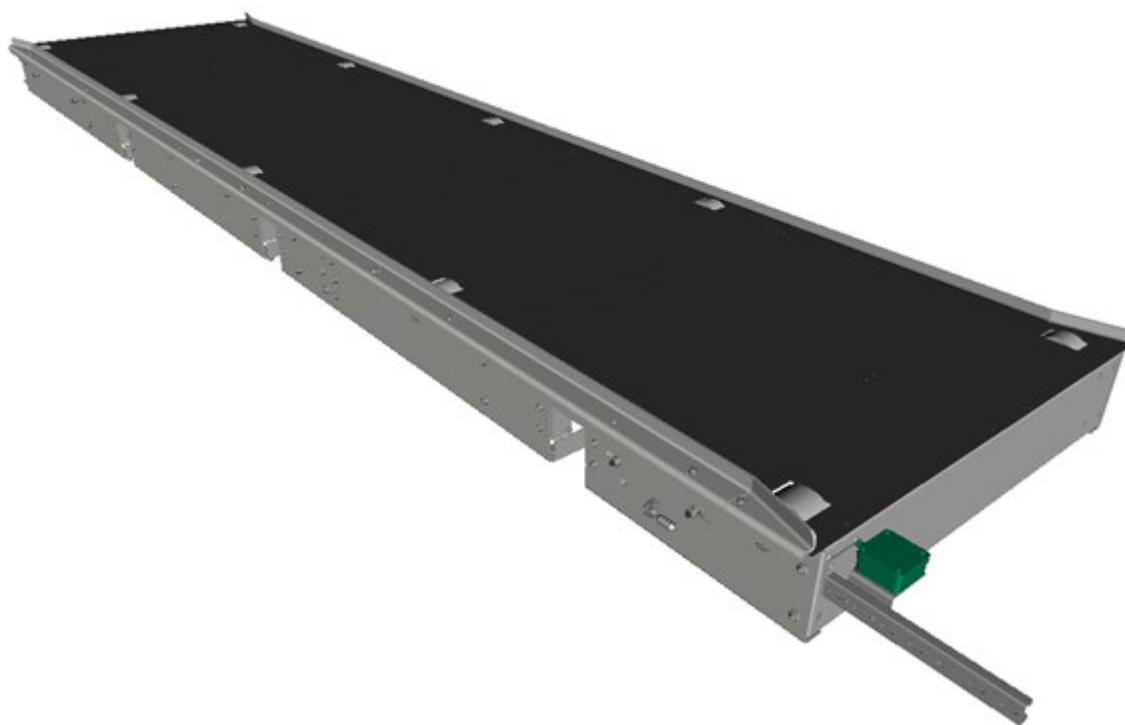
Procedure

Step	Task
10	A daily walk through inspection while the PRB is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belt, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the PRB / system when the beam and/or presents is blocked and/or sensed. If the PRB / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-405-00-00	Existing Shuttle Mounted PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

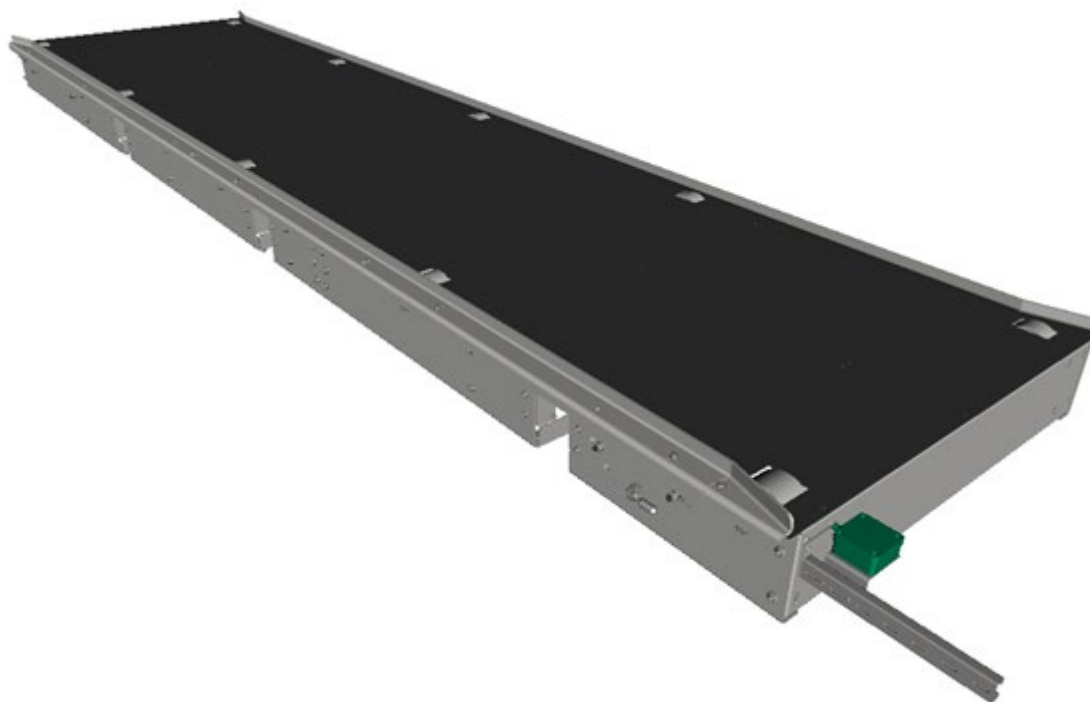
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-405-00-00	Existing Shuttle Mounted PRB – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
40	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
50	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devices or the motor.
60	Check the belt tension while the roller is operating under load. Look for any slippage on the pulley. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
70	Check the belt tracking on both the drive and driven pulleys while the roller is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
80	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
90	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
100	Inspect the roller for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devices or the motor. Wipe dry when finished.
110	Check the mounting is secure, tighten as necessary.
120	Check the PRB in operation under load and not under load, listen for any noises or note other observations where the PRB does not operate smoothly.

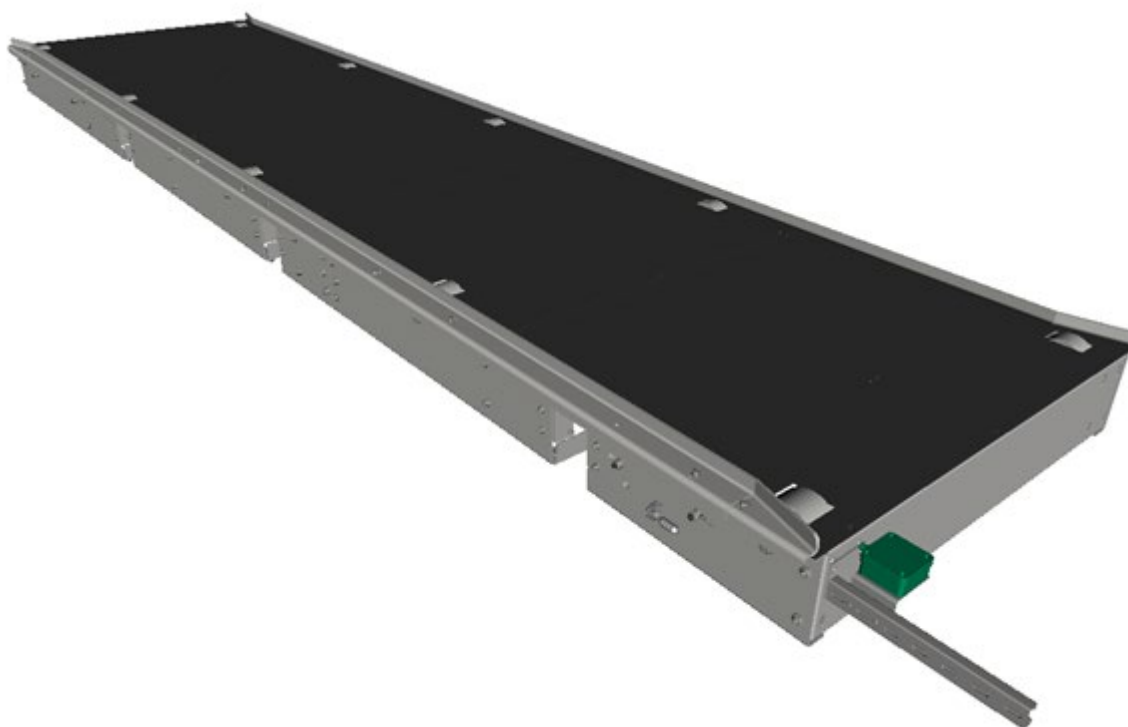
demo

Revision 1

O & M

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-405-00-00	Existing Shuttle Mounted PRB – 2000hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

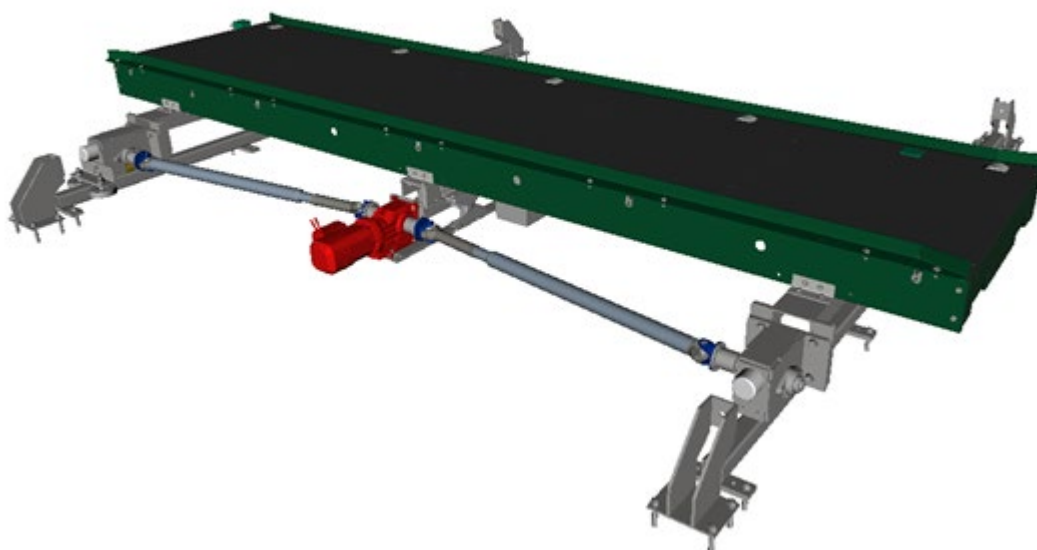
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-700-00-00	New Mulsanne Shuttle – Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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**OPERATION &
MAINTENANCE**

Project No #####
Buffer System

Procedure

Step	Task
10	A daily walk through inspection while the PRB is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belt, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the PRB / system when the beam and/or presents is blocked and/or sensed. If the PRB / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

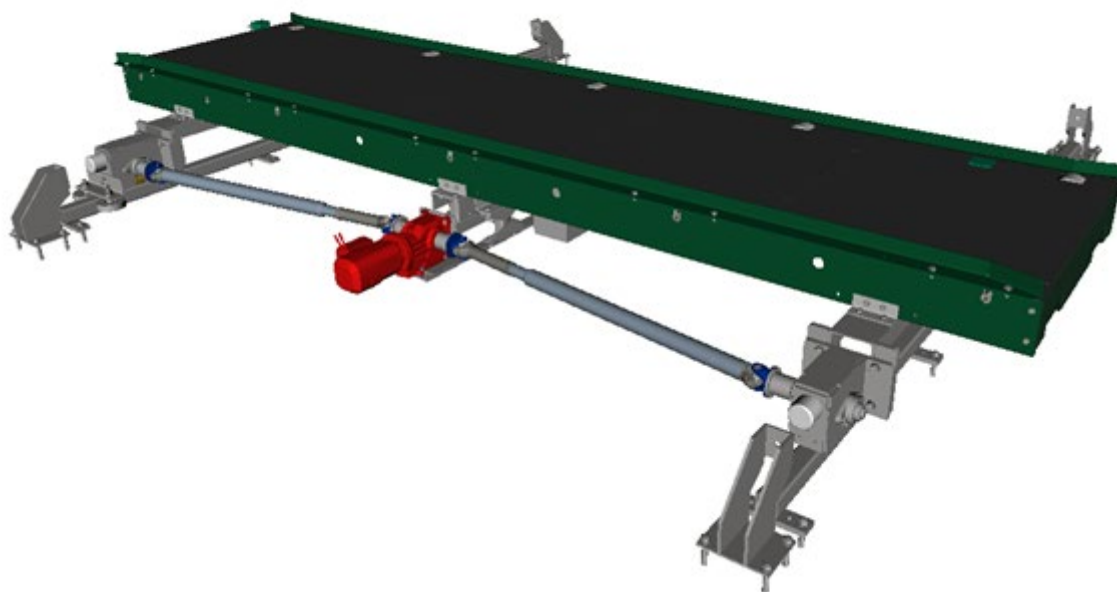
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Revision 1

O & M

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-700-00-00	New Mulsanne – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.
40	Check the shuttle wheel mounting fixings (bolts) are tight. Tighten and replace any missing fixings as necessary
50	Check the fixed stops ensure the fixings are tight and anchors are secure. Tighten as necessary.
60	Check that all sensors are aligned, tight and secured. Tighten as necessary
70	Check sensor wiring is not damaged and clear of any moving components. Replace immediately if damaged and re-secure if loose.

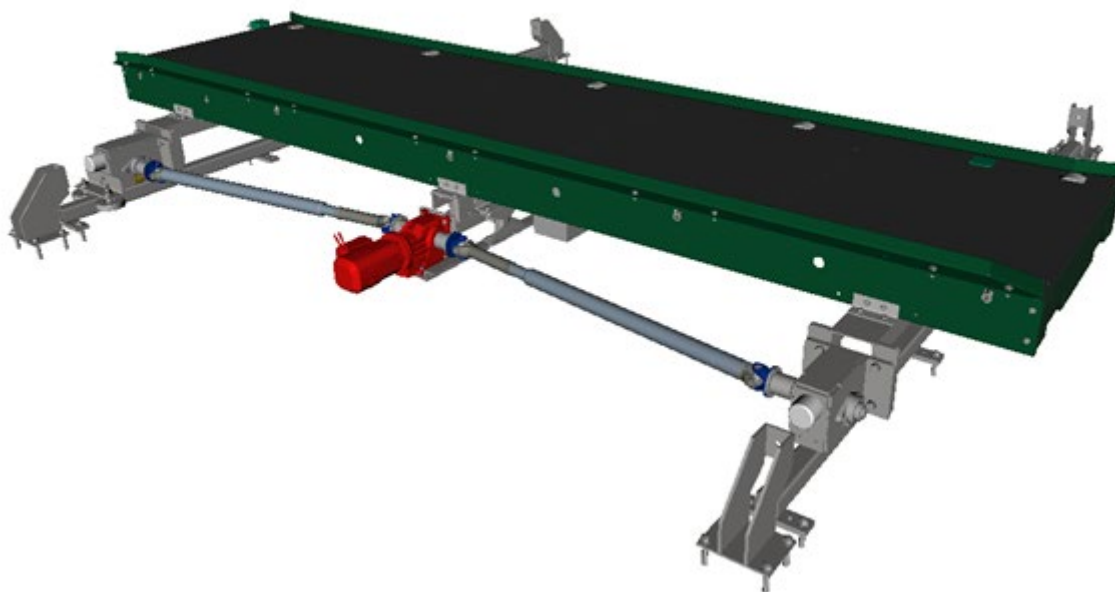
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Revision 1

O & M

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-700-00-00	New Mulsanne Shuttle – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
	Check the brake release cable is tensioned correctly. Retention if required.
30	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
40	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
50	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devices or the motor.
60	Check the belt tension while the conveyor is operating under load. Look for any slippage on the pulleys. When correctly tensioned the belt will not slip on the drive pulleys. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
70	Check the belt tracking on both the drive and driven pulleys while the conveyor is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
80	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
90	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
100	Inspect the roller for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devices or the motor. Wipe dry when finished.
110	Inspect the carrier rollers for any damage, bent shaft broken welds, worn surfaces. Replace any rollers that show any damage as noted above
120	Inspect carrier rollers with sealed or unsealed bearings for freedom of movement. Rollers that do not spin freely must be replaced immediately.
130	Check the guide wheels are rotating when the shuttle is moving, replace as necessary
140	Check the shuttle wheels are rotating when the shuttle is moving.

demo	Revision 1
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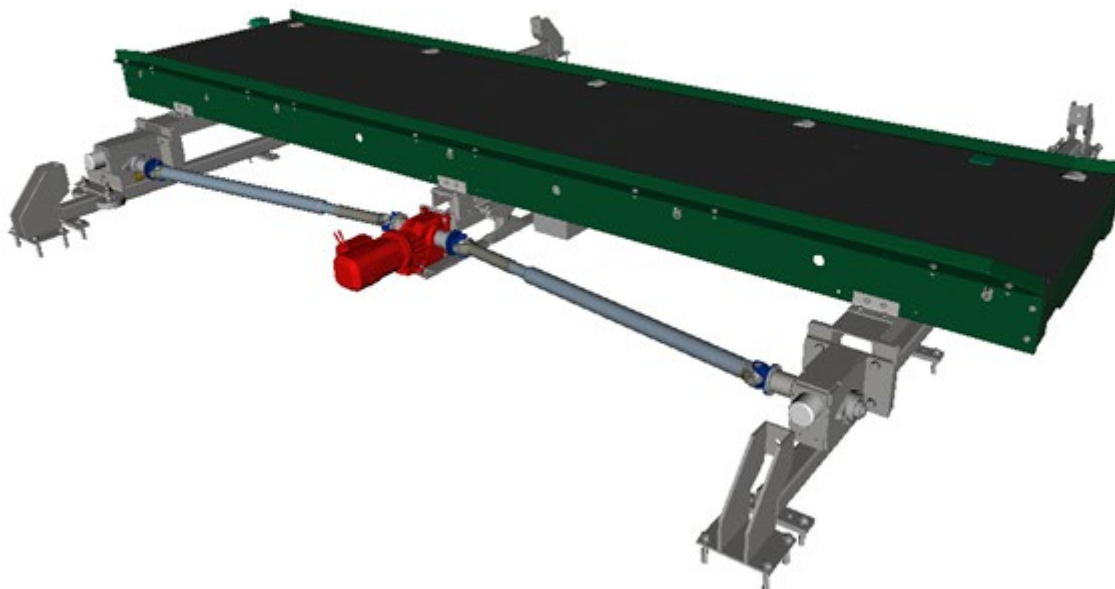
	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Step	Task
150	Check wheels when the shuttle is in operation under load. Ensure that the wheels are always in contact with the running surface. Check that the shuttle frame does not rock when product is loaded. If the wheels are always not in contact and/or the shuttle frame rocks when the product is load, relevel and align the shuttle.
160	Inspect the shuttle wheels for cleanliness and damage. Clean with soap and water, wipe dry when finished. If damaged replace immediately
170	Check shuttle wheels for delamination or uneven wear, replace as necessary.
180	Check the drive prop shaft fasteners are tight, tighten as necessary
190	Check the rotation of the drive and tension shafts are concentric and not wobbling, check the bearing is functioning correctly, re-align as necessary
200	<p>If shuttle belt is installed:</p> <p>Check the alignment of the shuttle belt, ensure that the belt wrap around the drive pulley is tight and aligned. Align if necessary.</p> <p>Check the belt tension. Tension if required and necessary.</p> <p>Check the fastener on the belt clamps to ensure they are tight. Tighten as necessary.</p> <p>Check the fasteners on the idler pulley bearing ensure they are tight. Tighten as necessary.</p>
210	<p>If gravity latch is installed:</p> <p>Check the mounting is secure, tighten as necessary.</p> <p>Check the rotation of the latch, ensure that it swings freely, lubricate as necessary.</p>
220	Check the shuttle in operation under load and empty, listen for any noises or note other observations where the shuttle does not operate smoothly.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-700-00-00	New Mulsanne Shuttle – 2000hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

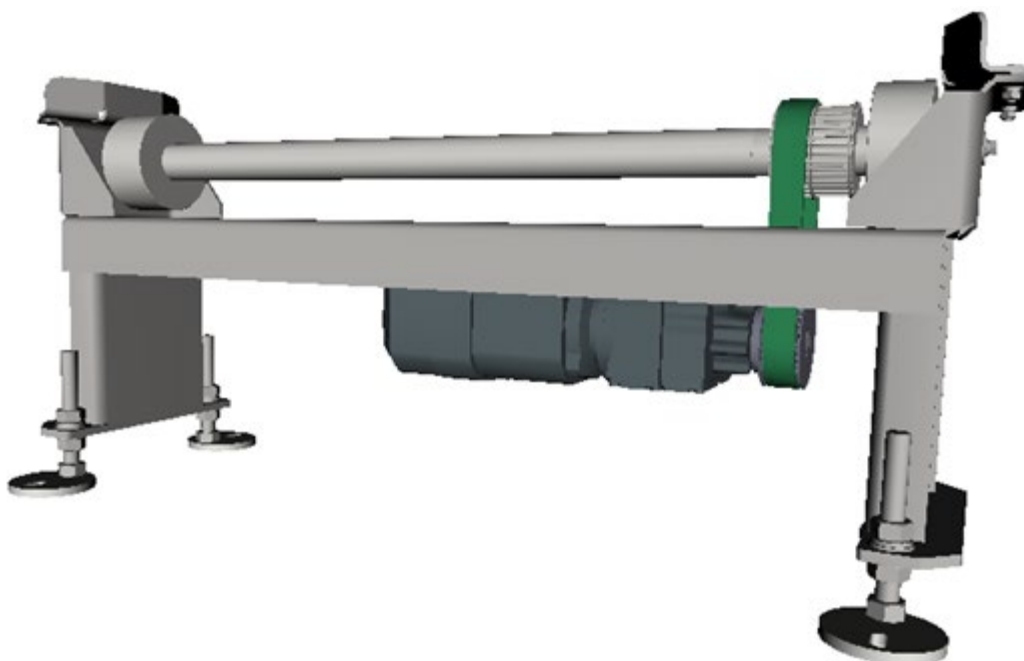
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Lubricate bearings through the grease fittings provided with a lithium base #2 grease such as Shell Avania #2 or equivalent. Do not over grease bearings as this could damage the seals.
20	Inspect the shuttle track for any signs of wear, grooving, warping or broken welds. Repair immediately or replace as necessary
30	Check the shuttle track drive mounting is secure and bolts are tightened. If there are any loose bolts re-align the drive assembly and tighten the bolts as necessary
40	Check the shuttle track is fastened securely to the floor
50	Check there is no signs of wear or grooving in the side of the shuttle track, repair or replace as necessary

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-406-00-00	Single Roller Stores PRB – Daily Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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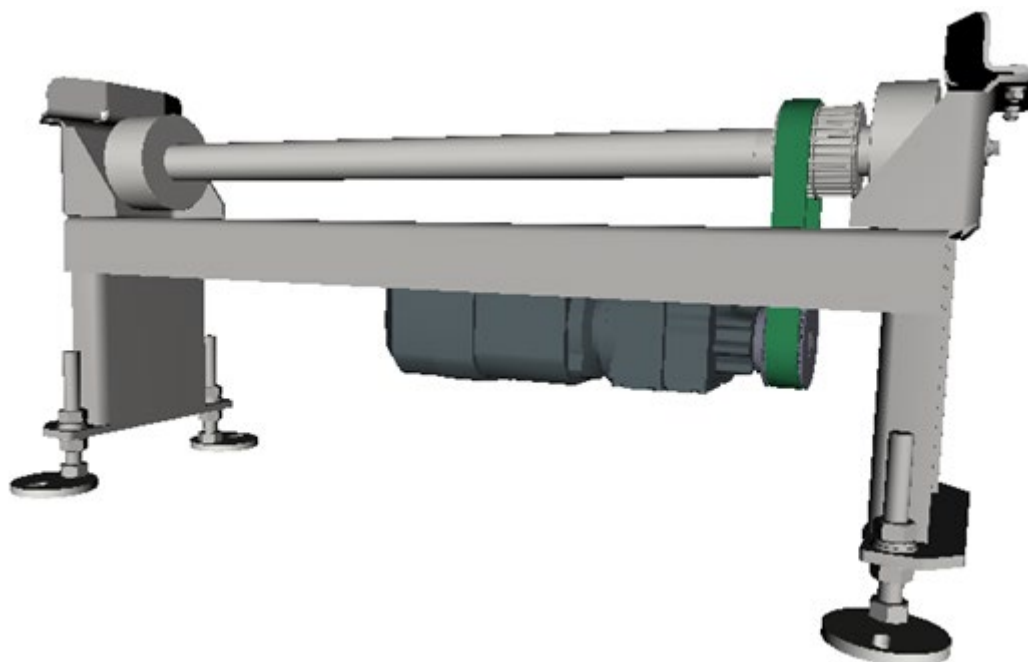
Procedure

Step	Task
10	A daily walk through inspection while the PRB is in operation is recommended.
20	Inspect for loose nuts and bolts, foreign objects, loose belts, miss-tracked belt, dry bearings and general cleanliness
30	Listen for noisy bearings, sprockets or pulleys, motors or reducers and other vibrations
40	Make sure all emergency stop circuits are operating properly by pressing all emergency stop palm buttons and/or pulling emergency pull cords.
50	Flag all photo eyes, proximity sensor and any other sensor designed to shut down the PRB / system when the beam and/or presents is blocked and/or sensed. If the PRB / system does not stop, check the sensor position, if the sensor is adjusted correctly and still does not shut down the equipment replace it.
60	Make sure all Access Gates function are operating properly by requesting access. The safety zone should shut down and remain isolated until automatic operation is restored after closing the access gates.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-406-00-00	Single Roller Stores PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

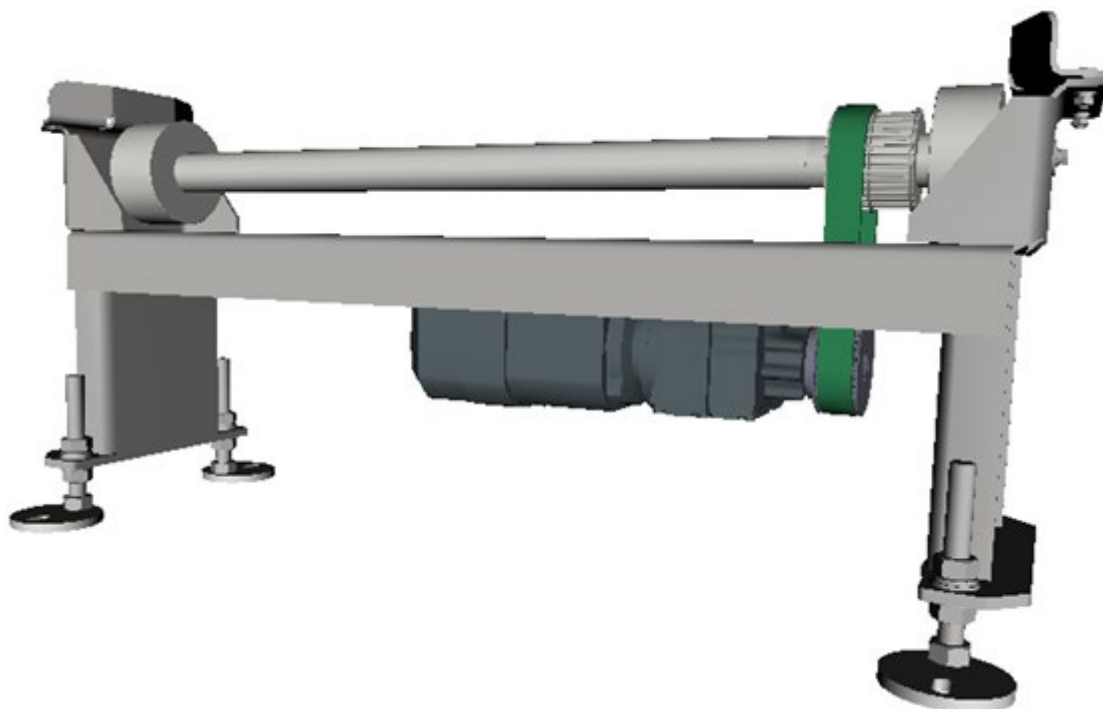
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-406-00-00	Single Roller Stores PRB – 600hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Remove any dirt build up from the motor and reducers that could interfere with the motor cooling. Use a wire brush, do not use a water base solution on the motor unless the motor is rated for clean down.
20	Check the reducer oil. If there are metal shaving and/or decolourisation of the oil, change the oil. Repeat the oil inspection after 200 hours of operation after an oil change.
30	Check the alignment of the drive and driven sprocket using a straight edge. Align if necessary.
40	Inspect the sprockets for damage, wear and fretting (rust colour between hub and shaft) Repair or replace as necessary.
50	Inspect the belts for damage or excessive wear. Make sure the belts are clean. Replace any damaged or worn belts. Clean dirty belts with soap and water; wipe dry when finished; make sure water does not get onto any electrical devices or the motor.
60	Check the belt tension while the roller is operating under load. Look for any slippage on the pulley. When correctly tensioned the belt will not slip on the drive pulley. If the belt continues to slip after tensioning check the underside of the belt for damage to the teeth. Replace as necessary.
70	Check the belt tracking on both the drive and driven pulleys while the roller is operating under load. If the belt is tracking off centre or not maintaining a consistent track, adjust the tracking.
80	Inspect the bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
90	Check bearing are secure within their mounting. Tighten mounting bolts as necessary.
100	Inspect the roller for cleanliness. Remove any oil, dirt, dust, etc. with soap and water or a cleaning solvent or waterless hand soap/wipes. Do not get water in the bearings or on electrical devices or the motor. Wipe dry when finished.
110	Check the mounting is secure, tighten as necessary.
120	Check the PRB in operation under load and not under load, listen for any noises or note other observations where the PRB does not operate smoothly.

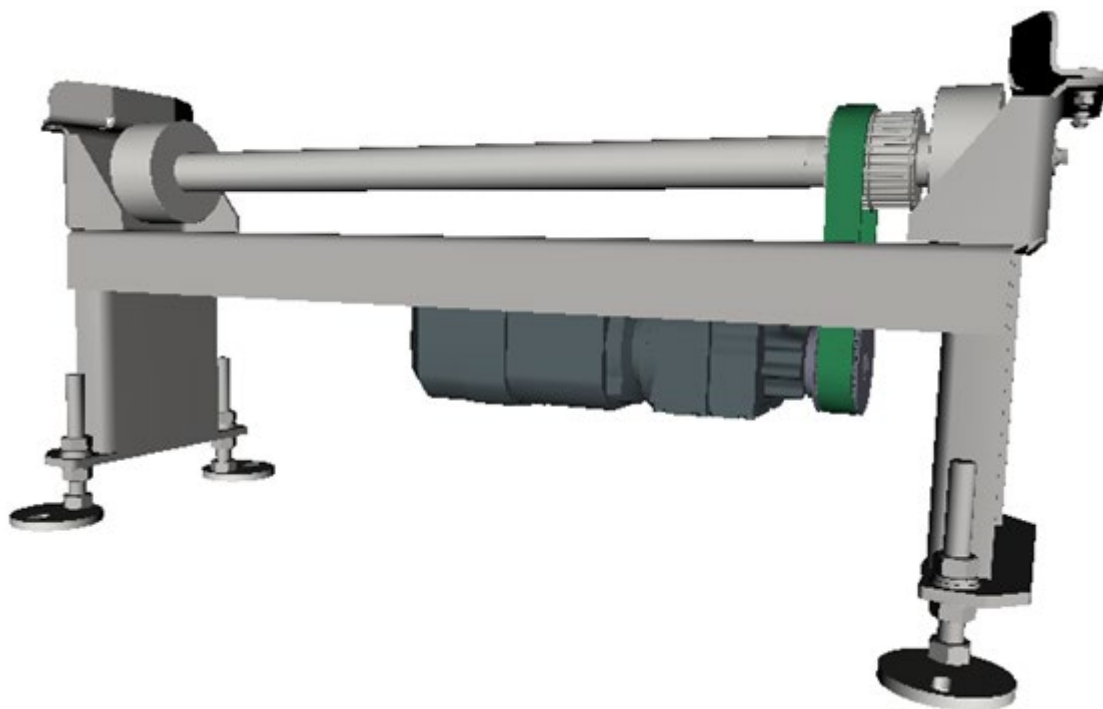
demo

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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-406-00-00	Single Roller Stores PRB – 200hrs Checks



Safety Conditions

- System locked off following ECPL procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Procedure

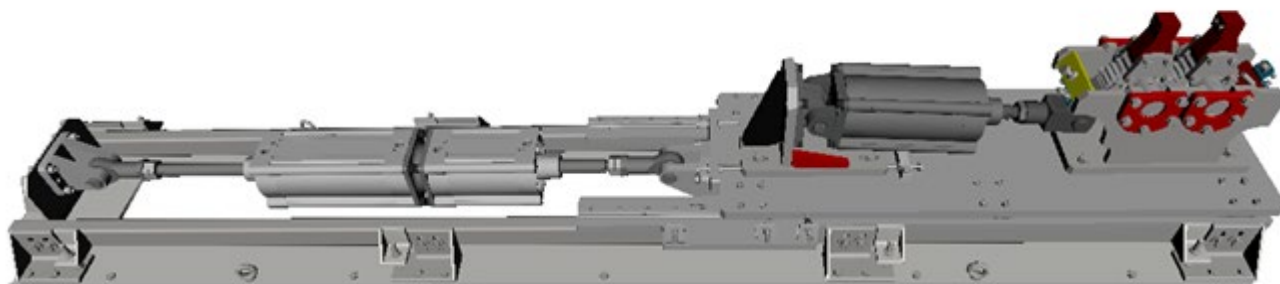
Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect the motors and reducers for loose or missing fixings and wiring. Tighten or replace fixing and wiring as necessary.
20	Observe the motors and reducers during operations. Listen for unusual noises and look for evidence of overheating. Repair or replace motor and reducers as necessary.
30	Check the motor current draw under loaded operating conditions.

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-501-05-00	Stores Skid Clamp – Weekly Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Check the floor bolt fixings holding skid clamp in place and tighten if necessary. Confirm with torque setting data sheet
20	Inspect cylinder unit for damage, in particular air leaks, cracks, abnormal noise in running. Replace damaged units if necessary.
30	Inspect cylinder unit fixing bolt match markings. Tighten any loose bolts, confirm with torque setting data sheet.
40	Inspect gears paying particular attention to worn teeth and correct mesh between gearing teeth. Replace gears as necessary.
50	Inspect rod clevis checking for excessive wear of rod including the thread. Replace as necessary.
60	Inspect assembly match markings. Tighten any loose bolts. Confirm with torque setting data sheet.
70	Check Limit Switches ensuring limit switches function (e.g. use steel key to activate sensor and check for amber light).
80	Check the skid clamp while in operation and confirm no defects are apparent.

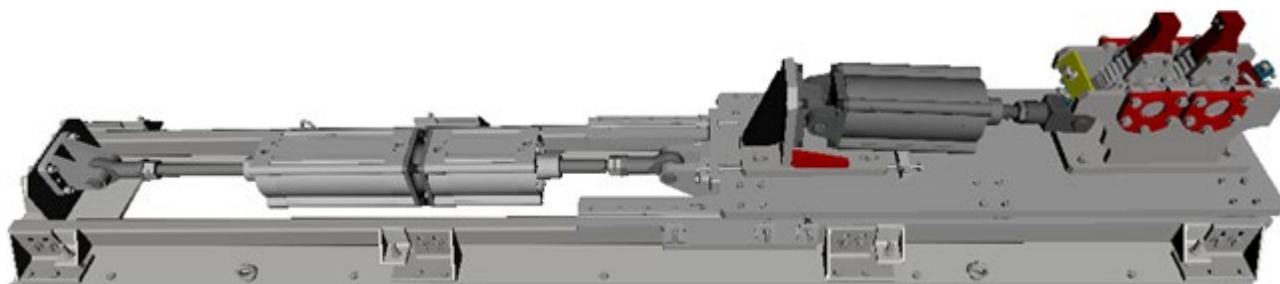
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Revision 1

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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-501-05-00	Stores Skid Clamp – Monthly Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

demo	Revision 1
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OPERATION & MAINTENANCE

Project No #####
Buffer System

Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect assembly welds. Check for cracks & broken welds - repair/replace where necessary.
20	Inspect the THK slides and linear bearings for excessive wear and damage. Make sure that the bearings operate smoothly and quietly. If a noise emits from the bearing or does not operate smoothly, is damaged or worn, replace it immediately.
30	Check linear bearing are secure within their mounting. Tighten mounting bolts as necessary.
40	Remove any dirt build up from the skid clamp that could interfere with the operation of the clamp.
50	Check and lubricate the linear bearings in accordance with the lubrication schedule.
60	Check the universal tie rod ends and cylinder tie rods are not loose, damaged or worn. Replace if necessary.

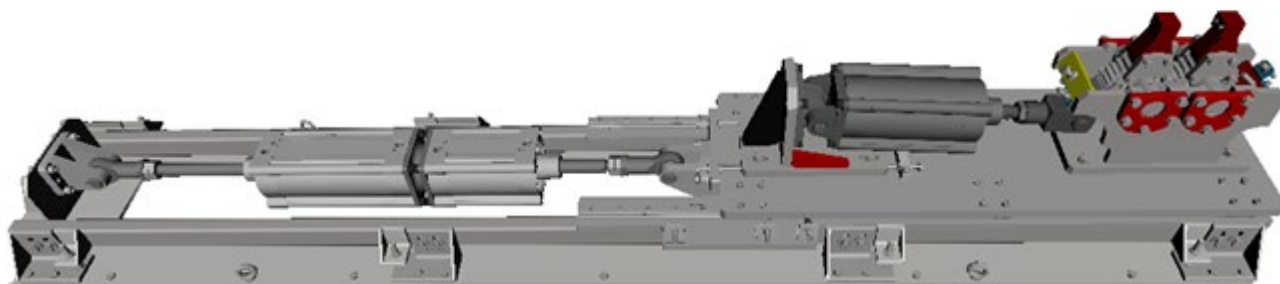
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Revision 1

O & M

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-501-05-00	Stores Skid Clamp – Annual Checks



Safety Conditions

- System locked off following LOTO procedure

Personal Protective Equipment (PPE)

- Safety Gloves
- Safety Shoes
- Bump Cap

Pre Requisites

- Stop the equipment

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Procedure

Note: Refer to the applicable OEM manufacturer's instructions for more specific maintenance instructions

Step	Task
10	Inspect all connections and general condition of the skid clamp, replace as necessary.

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3.6.4 Specific Maintenance Task

Equipment	Summary
Cross Transfers – Short, Medium, Long	General maintenance tasks



Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	Clear the Cross transfer of Skids
-	Safety Shoes	System in Manual
-	Bump Cap	

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Procedure – Chain Tension

After a few weeks of operation, the chains must be checked for tension and alignment. Chains must be adjusted to the correct tension to prevent surging and they do not jump teeth. Ensure that the chains are tracking correctly.

Step	Task
Note: Do not over tension the chains. Excessive tension will require additional power to drive and potentially cause the motor to overheat and electrical fault. There should be approximately 10mm of flexibility in the drive chain when tensioned correctly.	
10	Check the drive chain tension and tracking. It is important that the drive chain is tensioned correctly in order that it does not jump teeth and/or surge.


Procedure – Chain Tracking

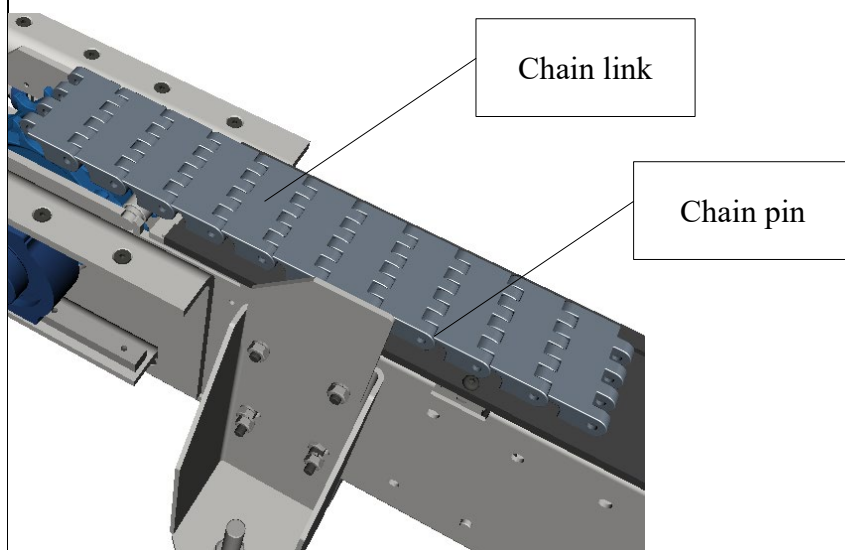
Chain tracking should be adjusted when a chain wanders off centre. If the chain wanders off centre but returns or if a Chain wanders off centre but returns and does not jump off the sprocket, no tracking is required.

Step	Task
10	Check the chains to make sure they are not rubbing against anything and there is no noise coming from the chains.
20	Check the chain for proper tension when the conveyor is running with a normal load of product. It should not jump teeth.
30	Make sure the return rollers are aligned and the conveyor is level.
40	Make sure the drive and tension sprockets are aligned with the track.
	If a chain is miss-tracking, it could result in the chain not being carried the sprocket. Tracking chains should be done with two people in order that the conveyor can be shut off if the chain begins tracking incorrectly or starts to come off the sprocket. Risk to personal injury as the chain must be operated in close proximity. Risk of the chain catching on loose clothing.
50	Turn the conveyor on and watch the chains as they rotate around the sprockets
60	If the chain is not tracking correctly check the sprockets are aligned correctly and bearings are not damaged.
70	Check that the track is level and aligned correctly. Check the end assembly is tightened correctly
80	Ensure that all chains are tracking correctly before leaving the conveyor.


Procedure – Chain Replacement

Conveyor Chain (Uni-Chain) requires that only damaged chain links need to be changed. Unlike steel roller chain the Uni-Chain is quickly changed and by removing individual links. Uni-Chain is not subject to stretching at the same rate as steel roller chain and does not need to be completely replaced.


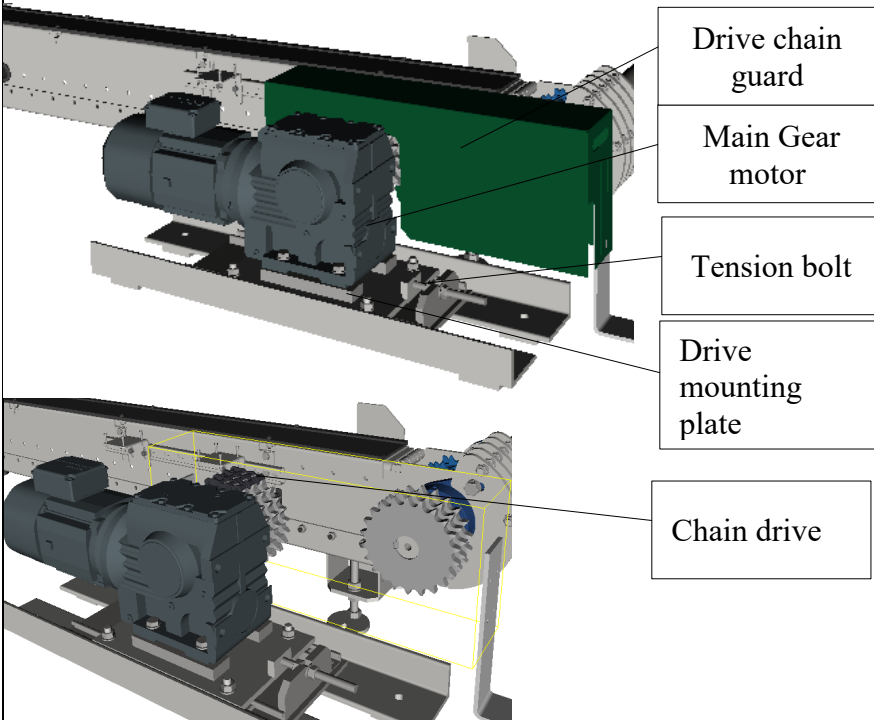
Step	Task
10	In manual maintenance mode drive the chain to the top track for easy access to the damaged chain links
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
20	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work
30	Identify the chain links that need to be replaced. Check the manual to ensure that the correct replacement chain has been selected.
40	Check the identification marking on the chain (if still visible) to compare against the replacement chain.
Note: The chain size and length has been specifically selected for the application of the conveyor (Speed, Product weight, operations, etc.) Do not substitute an inferior chain as it may not fit and/or provide the strength required for the application	
50	Loosen the tension bolts to slacken the chain. Place a wooden board under the chain to raise it off the chain track.



60	Use a short metal pin of a smaller diameter of the chain pin to press against the chain pin. Hold the pin against the end of the chain pin and tap the open end with a hammer to encourage the chain pin out. Continue to tap until the chain pin loosens. Pull the exposed end of the chain pin with pliers until the chain pin is removed and separate the chain.
Note: The chain pin can be removed and/or inserted from both sides of the chain.	
70	Repeat the same procedure at the other end of the chain to be replaced
80	Remove the damaged chain and insert a new section of chain of equal length


90	Connect the new chain to the existing chain with chain pins. It is recommended that new chain pins are used to connect the chain sections. If the old chain pin that was removed from the existing chain, ensure that the chain pin was not scored, bent or damaged when removing from the old chain.
	Do not use a bent or damaged chain pin to connect the chain. Damaged pins can adversely affect the operation of the chain and cause further damage to the chain, conveyor and potentially the product.
100	Remove the wooden board and lay the chain back onto the chain track. Visually inspect the chain the ensure it is straight at the new joints.
110	Re-tension the chain at the tension end
120	In manual mode rotate the drive to check the tracking and tension. If the tracking is not correct check the tracking instructions. If the chain jumps the sprocket check the chain tension.
130	Ensure that the Cross Transfer conveyor is functioning correctly before leaving the conveyor

Procedure – Drive Chain Replacement (Swapping Drive between main Drive and Back-up Drive)

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work
	
20	Remove the drive chain guard

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30	Loosen the tension bolts to slacken the chain. Place a wooden board under the chain to raise it off the chain track.
40	When the drive tension has been released locate the master chain link on the chain and remove.
50	Remove the chain and replace with the new chain. When replacing the chain ensure the joint is on the upper side to easily connect the ends.
60	Pull the two ends of the chain together. The gap between the ends should be slightly less than the pitch of the chain. If the chain ends overlap or is too far apart to make the connection, check the position of the drive with respect to the head shaft. Adjust the drive position to make the connection.
Note: The mounting plate should be adjusted to approximately the 20% point on the tension slide or tension bolt. The old chain will have stretched over time and the new chain will be shorter than the older chain. If the mounting plate is in the correct position and the overlap or gap remains the new drive chain may have to be shortened or lengthened respectively.	
70	Insert the master connecting link and adjust the drive chain tension from the tension bolt. If when tensioning the movement is more than the pitch length of the chain or more than 50% of the tension is used then the chain may be too long, it is recommended that the chain be shortened by (2) links.
80	(Back-up Drive) follow the same instructions for swapping the drive chain to the back-up drive.
90	Adjust the drive chain tension by the tensioning bolt. There should be approximately 12mm (1/2") slack in the drive chain between the drive and driven sprockets when the chain is tensioned correctly.
	Do not over tension the drive chain, this will cause premature stretching/wear and excessive amperage draw if the chain is excessively tight
100	When the tension is sufficient tighten the drive mounting bolts. Ensure that the drive is aligned between the drive and driven sprockets, use a straight edge across the faces of both sprockets to check the alignment
110	Run the conveyor in manual mode to check the drive is functioning correctly.
120	If everything checks right re-install the drive chain guard.
130	Ensure the conveyor is performing correctly before leaving the conveyor.


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Procedure – Motor and Reducer Replacement



In most applications the motor and reducer will have been supplied as a gearmotor, which is a single unit. In the rare application where the motor and reducer are supplied as separate units see the appropriate section for the replacement of the motor or reducer. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. To remove the reducer, use the following instructions.

Step	Task
	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before disconnecting the electrical wiring. Make sure the electrical wiring connection has been noted and can be re-wired in the same pattern.
Note: Some drives are wired through special connection terminal covers. Ensure that the replacement drive is suitable for the current application and wiring.	
Note: If a Back-up (Redundant) drive has been installed swap the drive chain before remove the motor/reducer. This will be the quickest change during production and reduce the downtime. Replace the motor/reducer at the earliest convenient time with respect to production.	
10	Loosen the drive mounting plate bolts, then loosen the drive chain tension at the tension bolt.
20	Follow the instructions for Drive Chain Replacement to remove the drive chain
30	Remove the bolts that fasten the motor/reducer to the drive mounting plate. Then lift the reducer off the drive plate. Ensure that proper lifting procedures are followed to avoid injury.
40	Place the reducer on the floor or a secure work surface and remove the drive sprocket. In some applications the drive sprocket is secure to the reducer output shaft by a taper lock bushing. (see 'Taper Lock Bushing' section)
50	Re-install the drive sprocket onto the new reducer output shaft and tighten the grub(set)screws/taper lock bushing to secure the drive sprocket to the shaft. It is a good working practice to apply an anti-seize lubricant to the reducer output shaft prior to installing the drive pulley. This will prevent rusting and seizing the drive pulley to the shaft
60	Apply a mild locking adhesive to the grub(set)screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub(set)screws. Follow the taper lock bushing installation in the 'Taper Lock Bushing' section if a taper lock bushing is installed
70	Replace the new reducer onto the drive mounting plate. Use proper lift procedures to avoid injury.
80	Fasten the reducer to the drive plate and install the drive chain back onto the drive pulley. Tight the chain tension using the tensioning bolt.
90	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive.
100	Apply power to the motor to test the rotation and function of the new drive. If there is a problem, make sure the power is isolated before attempting to correct the problem.
110	If everything checks ok re-install the drive chain guard.
120	If everything is correct re-connect the brake release cable if one was installed on the original drive.

130 Ensure the conveyor is performing correctly before leaving the conveyor.

Procedure - Prop Shaft Replacement

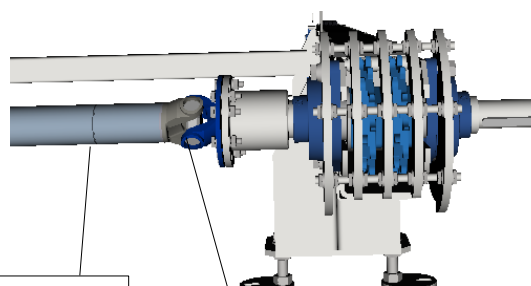
Before replacing the Prop Shaft check the universal joints have been lubricated properly and coupling fasteners are tight. If the prop shaft has been maintained correctly and still does not function correctly proceed with the replacement.

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Loosen the coupling bolts to separate the prop shaft from the drive shafts. Do not remove all the bolts leave a couple of bolts in place to support the shaft.
20	Before removing the Prop Shaft make sure the shaft is supported. Remove the remaining bolts to remove the prop shaft
	Ensure that proper lifting procedures are followed due to the length and weight of the prop shaft.
30	Remove the old prop shaft and insert the new prop shaft
40	Insert the bolts to connect the couplings and tighten. (Torque the bolts to the correct settings)

Prop Shaft



Prop Shaft




Prop coupling

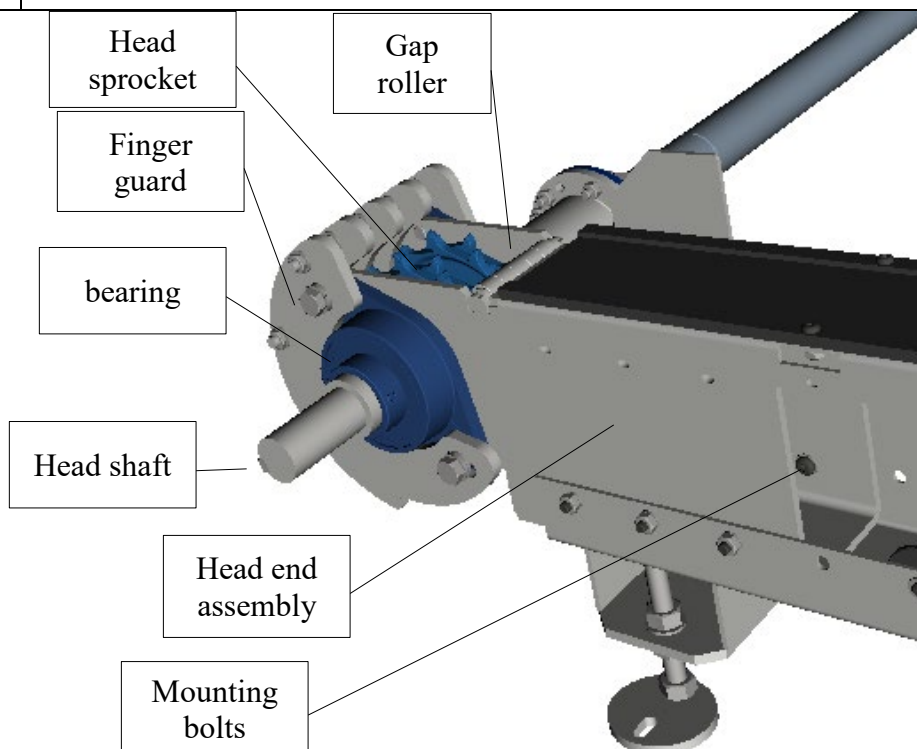
- | | |
|----|---|
| 50 | When the new prop shaft is connected and tightened properly, in manual mode rotate the drive to ensure the prop shaft transfers the drive to the both conveyor drive sprockets correctly. |
| 60 | Ensure the conveyor is performing correctly before leaving the conveyor. |

Procedure - Drive Sprocket / Shaft/ Bearing Replacement

If the Conveyor Head Sprocket, Drive Shaft and/or bearings need to be replaced, it is recommended that the complete Head End assembly be changed. This will be the quickest method in replacing the parts on the conveyor. Rebuild the Head End assembly in the maintenance area.


When changing the Head End assembly, the Prop Shaft will have to be removed. Follow the instructions for Prop Shaft Replacement when removing and installing the prop shaft.

Step	Task
10	In manual mode rotate the drive so that the master connecting link of the drive chain is exposed on the upper level, if replacing the Head End Assembly on the drive side
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
20	Adjust the tension on the drive chain at the tension bolt to slacken the drive chain tension. Remove the master link on the drive chain and split the chain. Remove the drive chain from around the driven sprocket.
30	Adjust the conveyor chain tension at the tension bolts on the tail end to slacken the tension. Break the conveyor Uni-Chain near the Head End assembly. Rotate the prop shaft manually to remove the Uni-Chain from around the head sprocket.
40	Remove the prop shaft, follow the Prop Shaft Replacement instructions



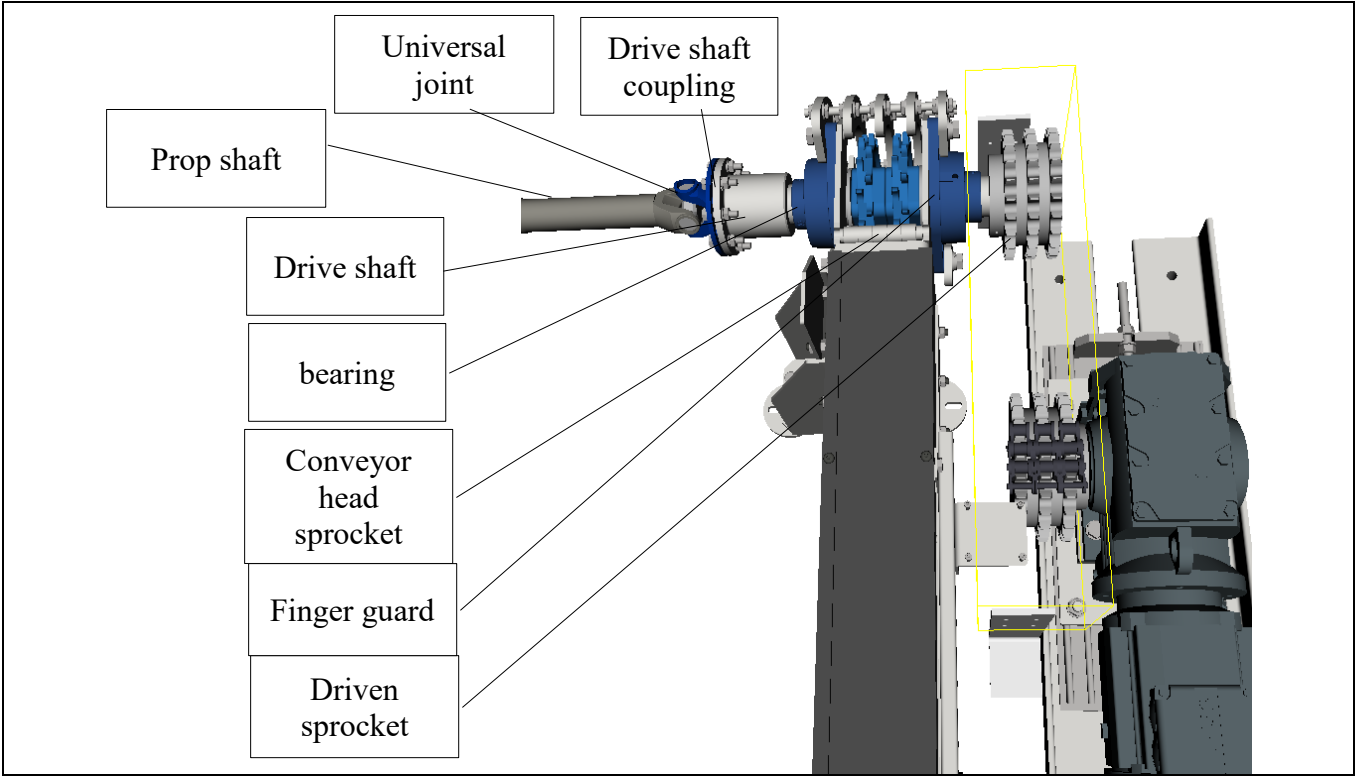
50 Remove the mounting bolts for the Head End assembly, located on the inside of the

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	conveyor track.
60	Slide the Head End Assembly out away from the conveyor track. Ensure to use proper lifting procedures when lift the Head End assembly
70	Insert the new Head End assembly (if available)
80	On a secure work surface break down the Head End assembly to replace the parts that are damaged. The Prop Shaft coupling flange will have to be removed on the inner side of the head shaft to replace the inner bearing. Remove the finger guards first to expose the inner parts of the Head End Assembly. Remove both bearings to replace the Head Shaft. On the drive side the driven sprocket will need to be removed.
90	When the new Head End Assembly is inserted, insert the mounting bolts and tighten. Make sure the Head End Assembly is square and aligned before tightening.
100	Remove the gap roller from the old Head End assembly and insert into the new Head End Assembly.
110	Re-install the Prop Shaft follow the Prop Shaft Replacement instructions.
	Care must be taken when feeding the chain around the sprockets. There are pinch points that can cause injury to fingers and hands. Guards are to be readjusted after the chain is installed to remove the pinch points.
120	Reconnect the conveyor Uni-Chain, the cover finger guards may have to be loosened off to increase the gap and allow the chain to pass through
130	When the conveyor chain is connected adjust the tension at the tail end
140	Re-connect the drive chain and adjust the chain tension
150	When everything is reconnected and adjusted rotate the drive in manual mode to test the operation. Check the conveyor chain tracking and for any noises that emit from the new Head End Assembly. Adjust as necessary
160	Install the drive chain guard when all adjustments have been completed.
170	Ensure the conveyor is performing correctly before leaving the conveyor



Note: the diagram below shows the Head End Assembly on the drive side.

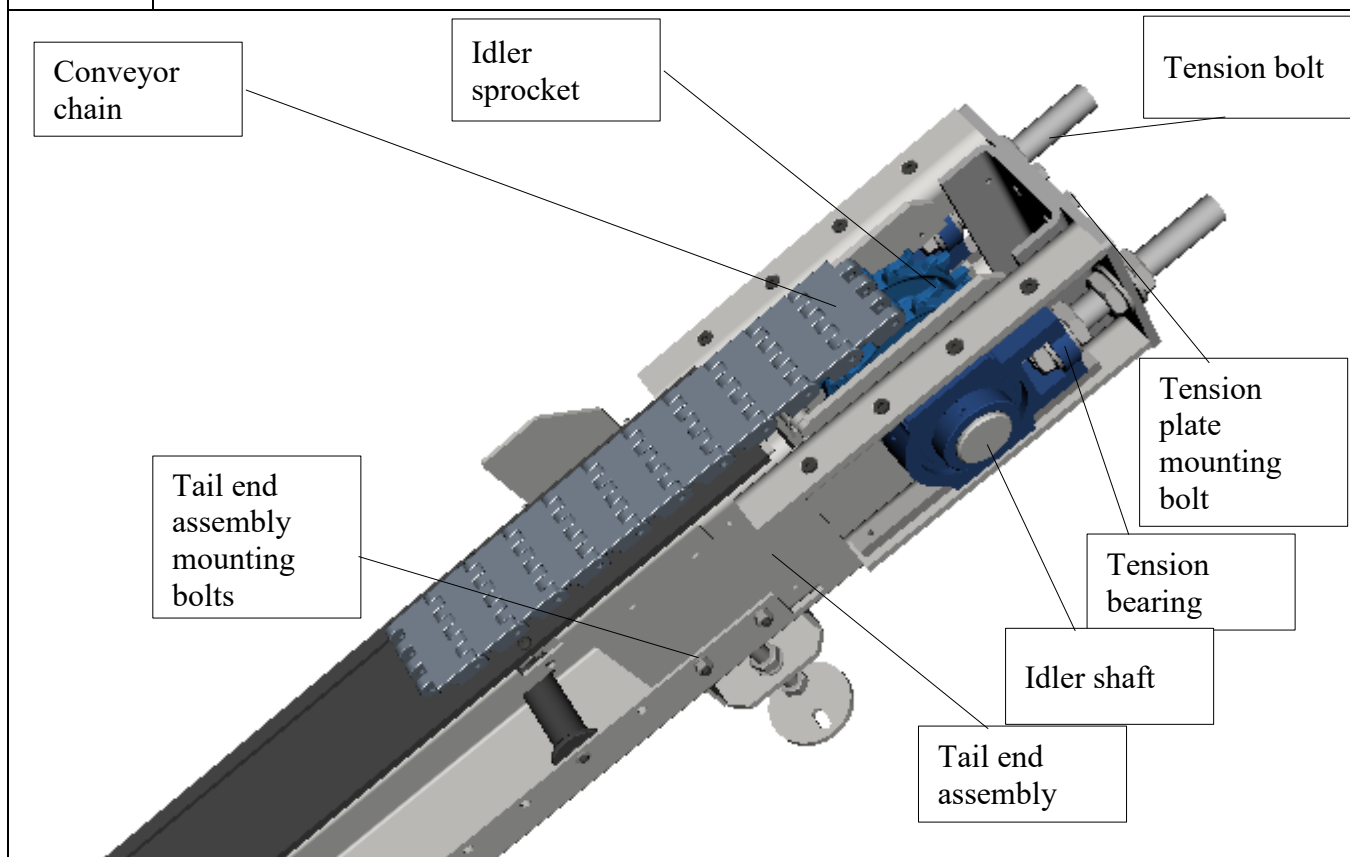
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Procedure - Tension Sprocket / Shaft/ Bearing Replacement

If the Tail Sprocket, Idler Shaft and/or bearings need to be replaced, it is recommended that the complete Tail End assembly be changed. This will be the quickest method in replacing the parts on the conveyor. Rebuild the Tail End assembly in the maintenance area.



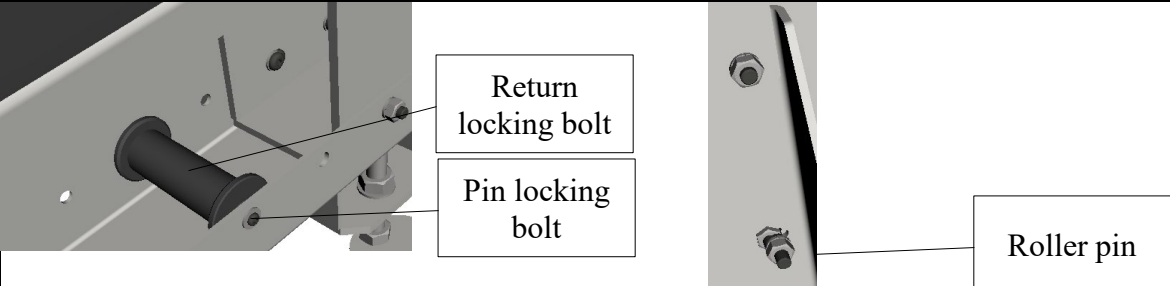
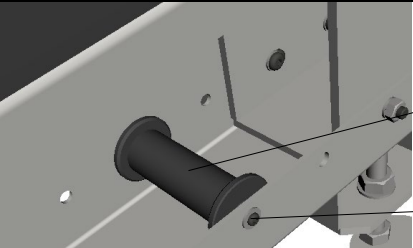

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Adjust the conveyor chain tension at the tension bolts on the tail end to slacken the tension. Break the conveyor Uni-Chain near the Head End assembly. Rotate the prop shaft manually to remove the Uni-Chain from around the head sprocket.
	Care must be taken when feeding the chain around the sprockets. There are pinch points that can cause injury to fingers and hands. Guards are to be readjusted after the chain is installed to remove the pinch points



20	Remove the mounting bolts for the Tail End assembly, located on the inside of the conveyor track.
30	Slide the Tail End Assembly out away from the conveyor track. Ensure to use proper lifting procedures when lift the Tail End assembly
40	Insert the new Tail End assembly (if available)
50	On a secure work surface break down the Tail End assembly to replace the parts that are damaged.

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	The Tension Plate will have to be removed to remove the tension bearings When the Tension bearings are removed from the Tail End Assembly the idler shaft and sprocket can be changed.
60	When the new Tail End Assembly is inserted, insert the mounting bolts and tighten. Make sure the Tail End Assembly is square and aligned before tightening.
70	Remove the gap roller from the old Tail End assembly and insert into the new Tail End Assembly
80	Reconnect the conveyor chain, the cover finger guards may have to be loosened off to increase the gap and allow the chain to pass through
90	When everything is reconnected and adjusted rotate the drive in manual mode to test the operation. Check the conveyor chain tracking and for any noises that emit from the new Tail End Assembly. Adjust as necessary
100	Ensure the conveyor is performing correctly before leaving the conveyor


Procedure - Return Roller Replacement	
Return Rollers are used to support the conveyor chain on the return route. They should never be installed on equal spacing due to the chain links rolling over the rollers at the same time potentially causing a surge in the chain operations	
Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Identify the return roller to be replaced. Manually lift the conveyor chain and insert a wooden board to support the conveyor chain on either side of the return roller to support the conveyor chain. Do not use metal spacers in case of potential damage to the conveyor chain
Note: The conveyor chain tension may have to be slackened to achieve enough slack chain to lift and get clearance to remove the return roller	
20	Loosen and remove the bolt on the outside of the chain track that holds the return roller pin in place
30	Using the same pin used push the conveyor chain pin out insert into the return roller mounting hole and push the roller pin out. Tap with a hammer if stiff
	Care must be taken when removing the return roller if the conveyor chain is installed. The conveyor chain can pinch and cause injury if not correctly supported when removing the return roller.
40	 <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">  <p>Return locking bolt</p> <p>Pin locking bolt</p> </div> <div style="text-align: center;">  <p>Roller pin</p> </div> </div>

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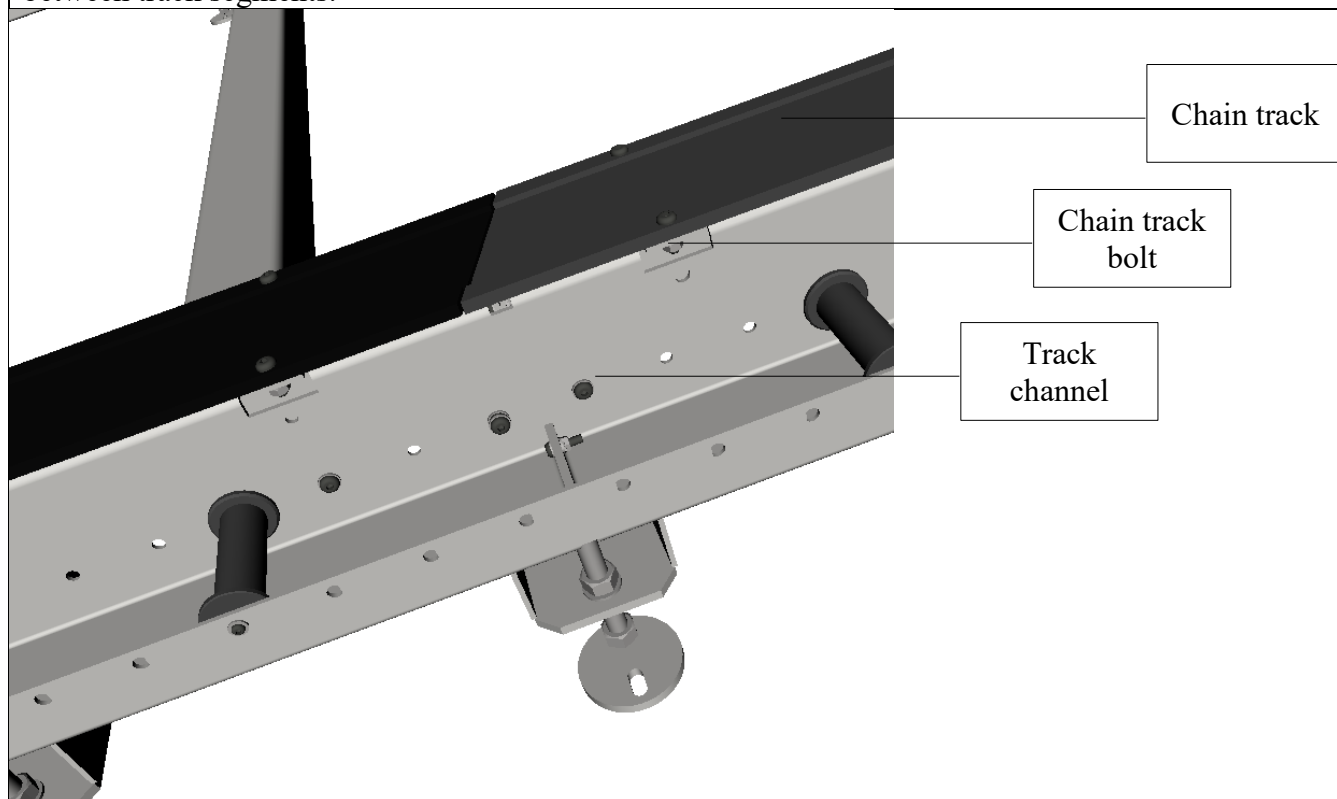
50	Replace the return roller with a new return roller. Use the same roller pin –if not damaged, replace if damaged.
60	Insert the pin locking bolt and tighten.
70	Remove the wooden boards and rotate the drive in manual mode to test the new return roller.
80	Ensure the conveyor is performing correctly before leaving the conveyor.

Procedure - Chain Track Replacement

If the chain track is required to be replaced, the chain track is supplied in standard lengths that are pre-drilled to suit the hole pattern in the track channel

Step	Task
10	Identify the length of chain track to be replaced. Ensure that enough replacement chain track is available before stripping the old chain track out.
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
20	Measure the damaged length of chain track to be removed. It is recommended that replacing a full length of chain track is preferred rather than a special cut length of chain track.

Note: The track joints should be cut at 45° to provide a smooth quiet transition for the conveyor chain between track segments.



Note: The conveyor chain tension may have to be slackened to achieve enough slack chain to lift and

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get clearance to remove the return roller..

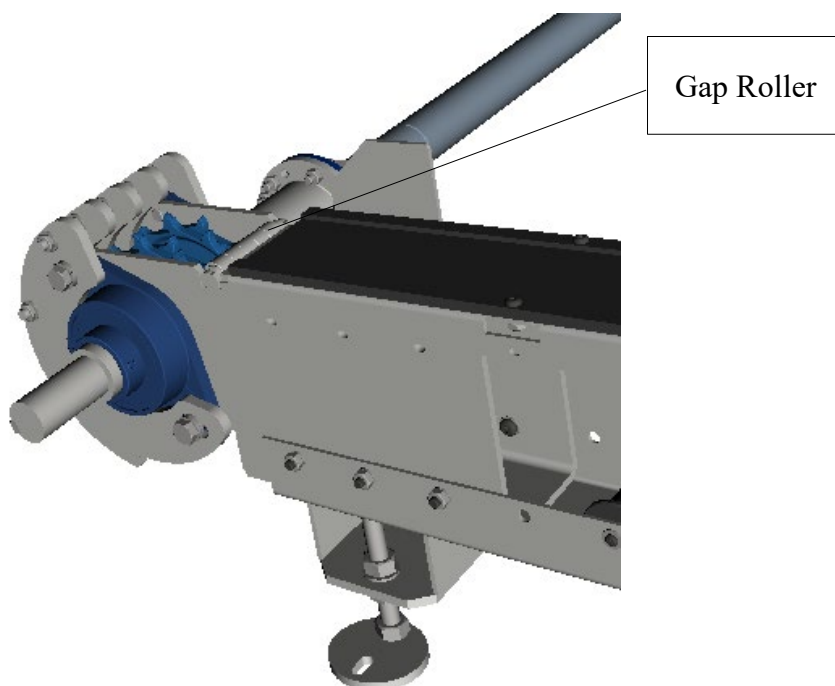
30	Break the conveyor chain at both ends where the track segment is to be replaced. See the Conveyor Chain Replacement instructions for the proper procedure when splitting the conveyor chain.
40	When the conveyor chain is removed loosen and remove the bolts secure the green plastic track to the track channel.
50	Install the pre-cut new green plastic track section and secure to the track channel with the same bolts. Check each bolt to ensure they are tight
60	Re-install the conveyor chain, follow the same Conveyor Chain Replacement instructions for the proper installation procedure.
70	Re-tension the chain at the tension end
80	In manual mode rotate the drive to check the tracking and tension. If the tracking is not correct check the tracking instructions. If the chain jumps the sprocket check the chain tension
90	Ensure that the conveyor is functioning correctly before leaving the conveyor.

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Procedure - Gap Roller Replacement

The Gap Roller is installed at each point where the conveyor chain transitioned between the chain-track to the sprockets. It is recommended that the whole gap roller is replaced and not the individual bearings

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Identify the gap roller to be replaced
	Care must be taken when removing the gap roller if the conveyor chain is installed. The conveyor chain can pinch and cause injury if not correctly supported when removing the gap roller.
20	Lift the chain and insert a wooden board to support the conveyor chain while exchanging the gap roller
Note: The conveyor chain tension may have to be slackened to achieve enough slack chain to lift and get clearance to remove the return roller.	
30	When the conveyor chain is supported remove the gap roller. The gap roller is not fastened to the end assembly, it is mounted in a pop-out slot.
40	Insert the new gap roller in the pop-out slot.
50	Remove the wooden boards to lower the conveyor onto the chain track.



60	In manual mode rotate the drive to check the gap roller. If the gap roller is not seated correctly, tap with a hammer to seat the gap roller.
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70 Ensure that the conveyor is functioning correctly before leaving the conveyor.

Procedure – reducer oil

It is important that the reducer oil is changed periodical. (See the OEM Manufacturer's Maintenance Instructions for the proper oil replacement procedure) Some reducers are sealed and do not required oil changes. (See the OEM Manufacturer's Maintenance Instructions to determine if the oil needs to be replaced)



Step

Task

Note: When handling oil of any sort proper Environment Protection procedures must be followed. All reducers supplied with the conveyor are supplied with a COSHH Sheet that has the identification and information about the oil contained in the reducer. Any replacement oil should have a COSHH sheet to identify the oil being installed.

if the oil does need to be replaced follow the same procedures for replacing the motor / reducer to remove the reducer from the conveyor



Follow the End Users Environment Protection procedures when changing oil. Oil must be drained and contained in a safe area using proper equipment to drain the oil. A spill kit must be readily available in case of spillage when draining and/or refilling the reducer with oil. Do not attempt to change the oil when the reducer is mounted on the conveyor

10

When the oil is removed check the oil for metal shavings on the first change. They are created as the internal components rub together during a break in period and are normal.

20

Check the oil shortly after the oil has been changed to ensure there is no presents of metal shavings. If there are metal shaving change the reducer because there is probably some wrong internally with the reducer

30

Return the reducer to the OEM manufacturer for a repair. If under warranty return the Acme Corp for a warranty claim service.


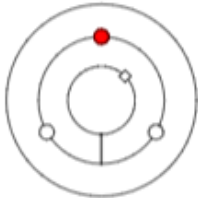
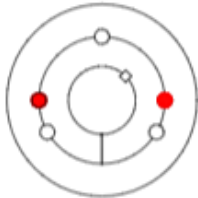
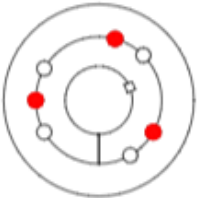
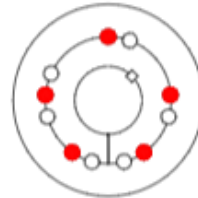
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Procedure - Taper lock Bushing

Taper lock Bushing are used to secure the sprockets and/or pulleys to shafts. This is a generic procedure that applies to all taper lock bushing with grub (set) screws.

Step	Task
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work.
10	If the taper lock bushing is used in the pulley mounted on the motor/reducer follow the removal procedure.
    <p>1008 TO 3030 3535 TO 6050 7060 TO 10085 120100</p>	
20	Remove all the screws holding the bushing in place.
30	Insert a screw(s) in bushing hole(s) marked 'Red' circle to loosen the bushing, alternating the tightening of the screws.

Procedure - Taper lock Bushing Replacement

Step	Task
10	Clean the shaft, bore of the bushing, outside of the bushing and hub bore of all oil, paint and dirt. File any burrs
20	Insert the bushing into the hub. Match the hole patterns, not the threaded holes (each completed hole will be threaded on one side only)
Note: If two bushing are used on the same component and shaft, fully tighten one bushing before working on the other	
	Do not lubricate the bushing taper, bushing bore, hub taper or shaft. Doing so could result in breakage of the product
30	Lightly oil the grub (set) screws and thread them into those half-threaded holes indicated by the 'RED' circle
	Do not use worn Hex Key wrenches. Doing so may result in a loose assembly or may damage the screws
40	Position assembly on the shaft allowing for the axial movement which will occur during the tightening process
50	Alternately torque the grub (set) screws to the recommended torque setting
Note: When installing bashing in sintered steel product (such as a sheave, coupling, etc.), follow torque recommendations on the product if present.	
	Where bushing are used with lubricated products such as chains, gears, grid couplings, be sure to seal all pathways (where lubrication could leak) with RTV or similar material

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60	To increase the gripping force, hammer the face of the bushing using a drift or sleeve
70	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose

Note: Do not hit the bushing directly with a hammer or any blunt objects.

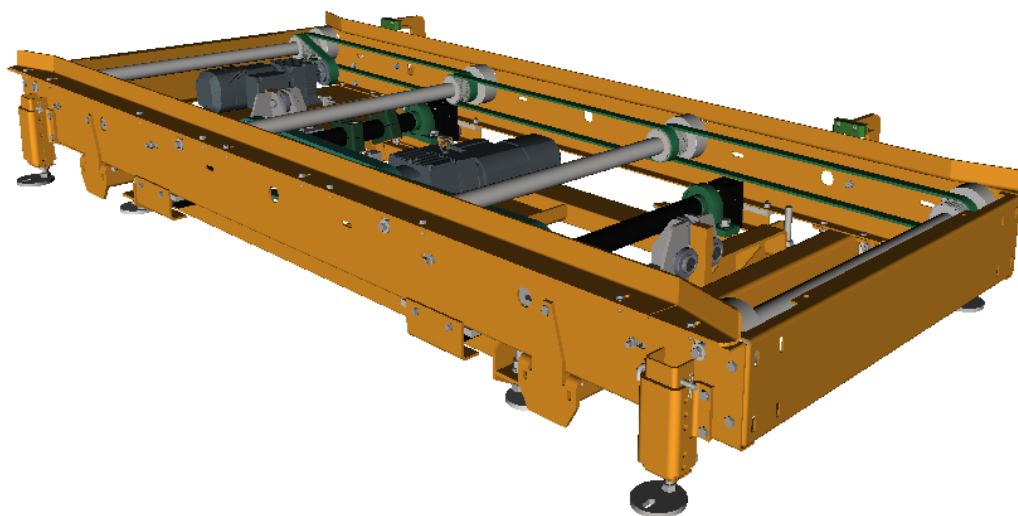
Brush Number	Torque (lb/in)	Torque(lb/ft)
1008,1108	55	4.6
1210,1215,1310	175	14.6
1610,1615	175	14.6
2012	280	23.3
2517,2525	430	35.8
3020,3030	800	66.7
4040	1700	141.7
4545	2450	204.2
5050	3100	258.3
6050,7060,8065	7820	651.7
10085,120100	13700	1141.7

80	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose
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Equipment	Summary
CAM lifter conveyor	General maintenance tasks



Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	Clear the Cross transfer of Skids
-	Safety Shoes	System in Manual
-	Bump Cap	


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After a few weeks of operation, the belts must be checked for tension and alignment. Belts must be tight between rollers in order that they do not jump teeth. Ensure that the belts are tracking correctly. Check the drive belt tension and tracking. It is important that the drive belt is tensioned correctly in order that it does not jump teeth.

Note: Do not over tension the belts. Excessive tension will require additional power to drive the rollers and cause the motor to overheat and electrical fault. There should be approximately 10mm of flexibility in the belt when tensioned correctly.


Procedure – Belt Tracking

Belt tracking should be adjusted when a belt wanders off centre. If a belt wanders off centre but returns or if a belt wanders off centre but does not rub on the edges of the pulley, no tracking is required.

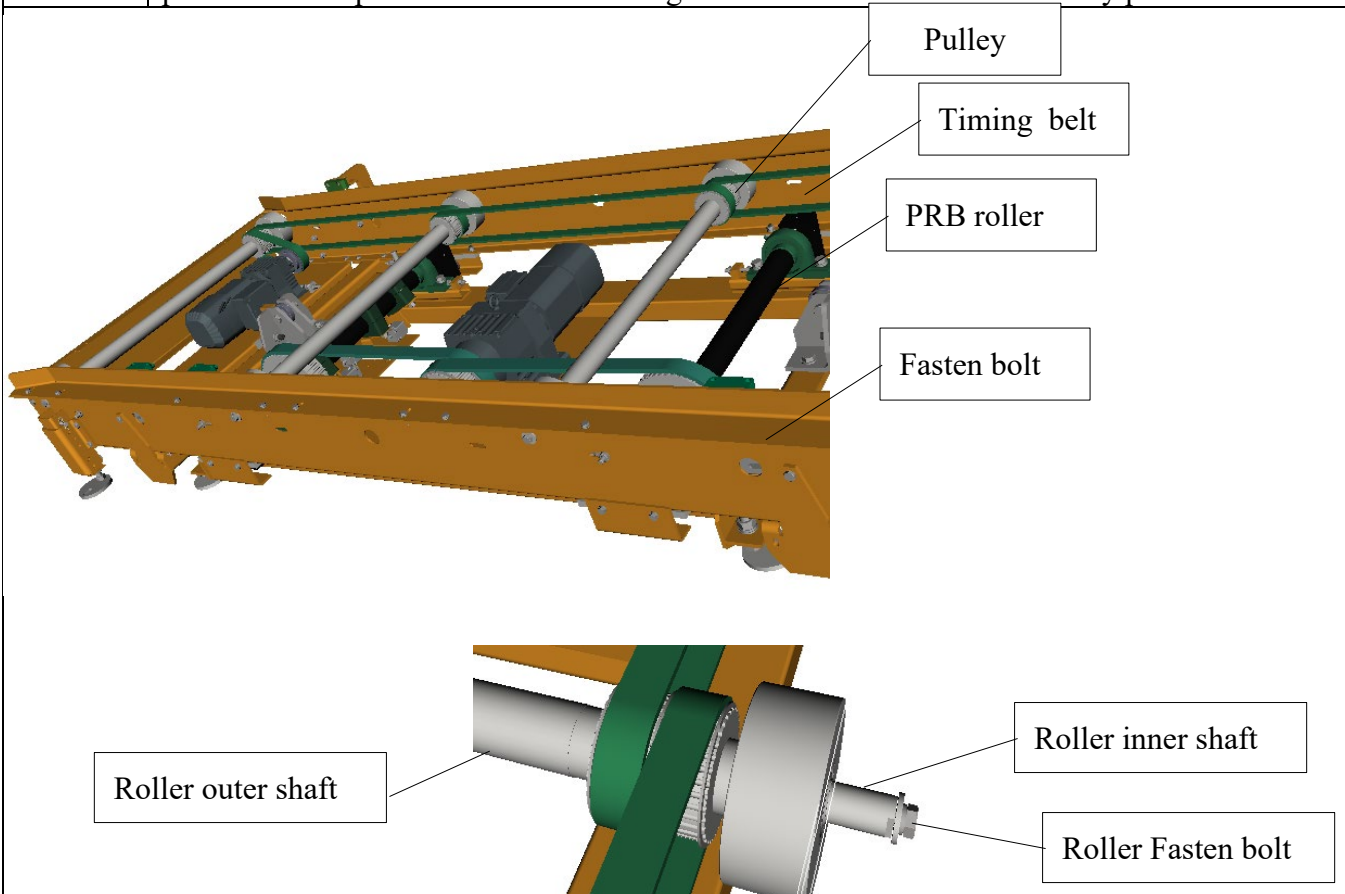
Step	Task
10	Check the belts to make sure they are not rubbing against anything and there is no noise coming from the belts.
20	Check the belt for proper tension when the conveyor is running with a normal load of product. It should not slip / jump teeth.
30	Make sure the rollers are aligned and the conveyor is level
40	Make sure the drive is square to the drive roller
50	Make sure all rollers are tightened correctly to the side channel
	If a chain is miss-tracking, it could result in the chain not being carried the sprocket. Tracking belt should be done with two people in order that the conveyor can be shut off if the belt begins tracking incorrectly or starts to come off the pulley
60	Turn the conveyor on and watch the belts as they rotate the rollers. Ensure that all belts are tracking correctly before leaving the conveyor.

Procedure – Belt Tracking

When a belt needs to be replaced proceed following this guide to replace the belt;

Step	Task
	Follow lock out and isolation procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work.
20	Identify the belt that needs to be replaced. Check the manual to ensure that the correct replacement belt has been selected as the replacement
30	Check the identification marking on the belt (if still visible) to compare against the replacement belt.
40	Loosen the bolts on both ends of the roller in order to remove the roller. Once loosen lift the roller so that it can be move laterally in the side channel hole. Push the roller end with the pulleys towards the side channel in order to expose the other end so that the roller can be lifted up.

50	When the roller is removed from the holes twist the roller to slacken the belts. Slip the belts off the roller
60	Repeat the same procedure with the adjacent roller on which the belt is to be replaced.
70	Slip the belts off the rollers
80	Insert the replacement belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern




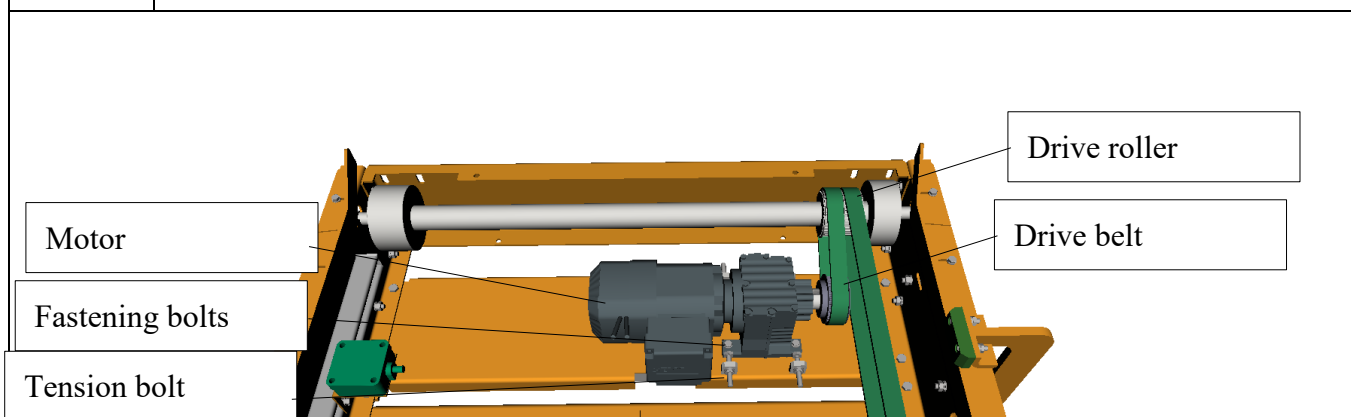
Note: The belt size and length has been specifically selected for the application of the conveyor (Speed, Product weight, operations, etc.) Do not substitute an inferior belt because it may not fit and/or provide the strength required for the application

90	Re-insert the rollers into the side channels and fasten the bolts to lock the rollers in place
100	Check the belt tension and tracking before leaving the conveyor.

Procedure – Drive Belt Replacement

When the drive belt needs to be replaced proceed following this guide to replace the drive belt;

Step	Task
	Follow lock out and isolation procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work.
20	Loosen the bolts that hold the drive in place on the drive mounting plate. Once loosen back off the tension bolts that are used to tension the drive belt
30	When the drive tension has been released slip the drive belt off the drive pulley.
40	Follow the same procedure for removing a roller (See the Belt Replacement Section) to remove the drive roller. If the drive belt snapped the roller will still need to be removed
50	When the roller is removed from the holes twist the roller to slacken the belts. Slip the belts off the roller
60	Insert the replacement drive belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern
70	Insert the roller to roller belt over the pulley and install the roller back into the side channel.
80	Pull the drive back to apply tension to the drive belt, then tighten the tension bolts to apply additional tension to the drive pulley.
90	When the tension is sufficient tighten the drive mounting bolts. Ensure that the drive is square to the drive roller, use a straight edge to check the alignment
100	Release the brake on the drive to turn the drive roller and check the alignment. If everything seems ok apply power to perform the final check.
110	Check the tension of the belt when the conveyor drive is under load and the belt tracking. If the drive belt jumps apply additional tension. If the tracking is not correct adjust the drive tension bolts to adjust the tracking of the drive belt.
120	Ensure the drive is performing correctly before leaving the conveyor.




Procedure – PRB Drive

In most applications the motor and reducer will have been supplied as a gearmotor, which is a single unit. In the rare application where the motor and reducer are supplied as separate units see the appropriate section for the replacement of the motor or reducer. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. When the gearmotor needs to be replaced proceed following this guide to replace the gearmotor

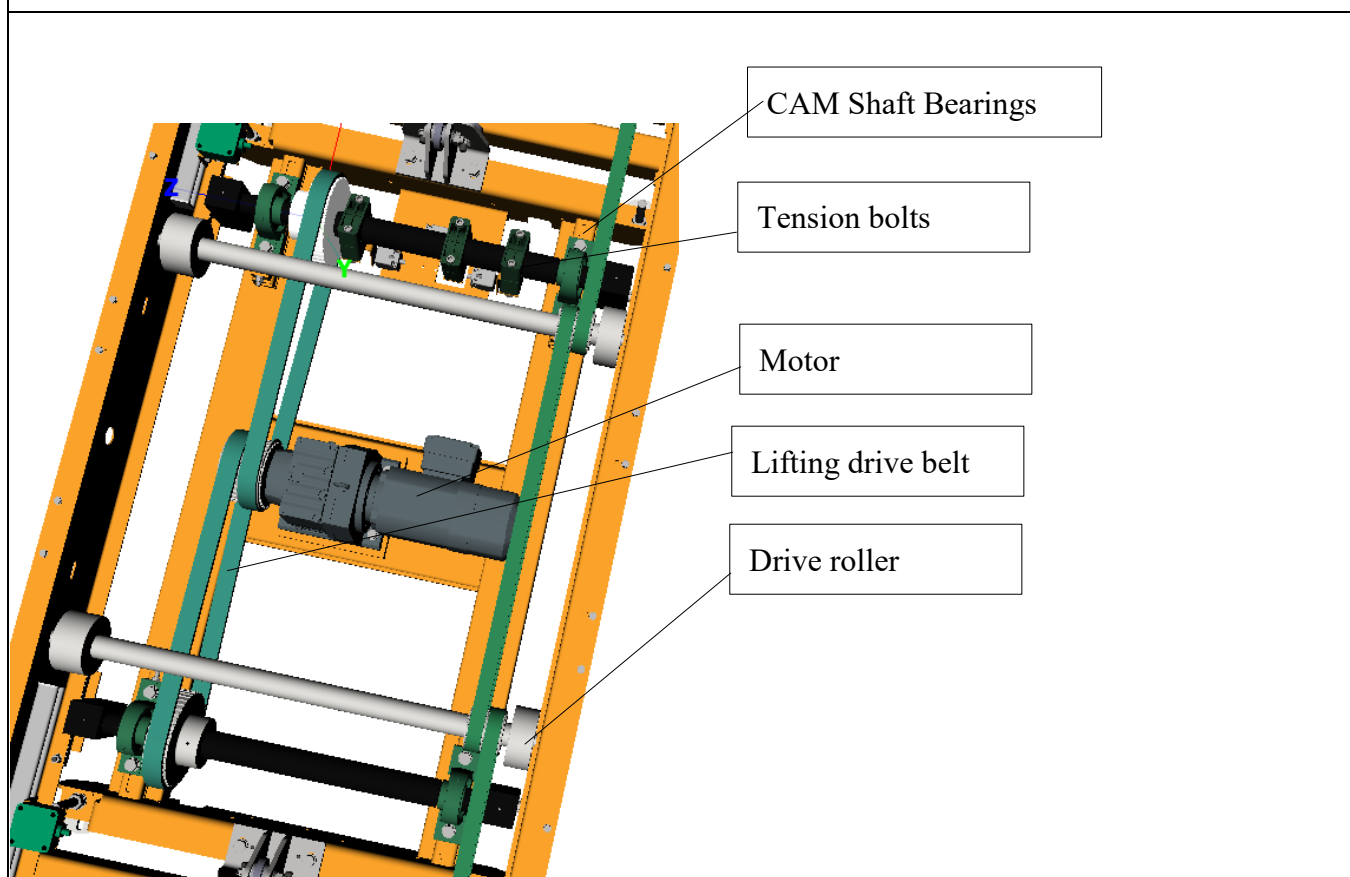
Step	Task
Note: Some drives are wired through special connection terminal covers. Ensure that the replacement drive is suitable for the current application and wiring.	
10	Disconnect the brake release cable if one has been installed.
20	Loosen the tension from the drive belt by loosen the tension bolts on the drive mounting plate
30	When the drive belt tension has been loosened slip the drive belt off the drive pulley.
40	Remove the bolts that fasten the reducer to the drive plate. Then lift the reducer off the drive plate. Ensure that proper lifting procedures are followed in order to avoid injury.
50	Place the reducer on the floor or a secure work surface and remove the drive pulley. In some applications the drive pulley is secure to the reducer output shaft by a taper lock bushing. (see 'Taper Lock Bushing' section)
60	Re-install the drive pulley onto the new reducer output shaft and tighten the grub(set)screws/taper lock bushing to secure the drive pulley to the shaft. It is a good working practice to apply an anti-seize lubricant to the reducer output shaft prior to installing the drive pulley. This will prevent rusting and seizing the drive pulley to the shaft.
70	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws. Follow the taper lock bushing installation in the 'Taper Lock Bushing' section if a taper lock bushing is installed.
80	Replace the new reducer onto the drive plate. Use proper lift procedures to avoid injury.
90	Fasten the reducer to the drive plate and install the drive belt back onto the drive pulley. Tight the belt tension using the tensioning bolts.
100	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive
110	Apply power to the motor to test the rotation and function of the new drive. If there is a problem, make the power is isolated before attempting to correct the problem.
120	If everything is correct re-connect the brake release cable is one was installed on the original drive.
130	Check the fasteners are tight and belts aligned before leaving the conveyor


Procedure – Lifting Drive

In most applications the motor and reducer will have been supplied as a gearmotor, which is a single unit. In the rare application where the motor and reducer are supplied as separate units see the appropriate section for the replacement of the motor or reducer. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. When the gearmotor needs to be replaced proceed following this guide to replace the gearmotor

Step	Task
	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before disconnecting the electrical wiring. Make sure the electrical wiring connection has been noted and can be re-wired in the same pattern.

Note: Some drives are wired through special connection terminal covers. Ensure that the replacement drive is suitable for the current application and wiring.



10	Set the PRB Support legs to the floor and lock in place. (see PRB Conveyor Support section)
	Risk of Personal injury and damaging the equipment. It is important to ensure the PRB supports are secured in the down position because there will be nothing to hold the PRB bed from falling once the lift drive motor is removed. Also, the cam shafts are moved to release the tension on the lifting belts.
20	Disconnect the brake release cable if one has been installed.



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30	Loosen the tension from the lift belts by loosen the tension bolts on the cam shaft bearings.
40	When the lift belt tension has been loosened slip the lift belts off the drive pulley.
50	Remove the bolts that fasten the reducer to the drive plate. Then lift the reducer off the drive plate. Ensure that proper lifting procedures are followed in order to avoid injury.
60	Place the reducer on the floor or a secure work surface and remove the drive pulley. In some applications the drive pulley is secure to the reducer output shaft by a taper lock bushing. (see 'Taper Lock Bushing' section)
70	Re-install the drive pulley onto the new reducer output shaft and tighten the grub (set) screws/taper lock bushing to secure the drive pulley to the shaft. It is a good working practice to apply an anti-seize lubricant to the reducer output shaft prior to installing the drive pulley. This will prevent rusting and seizing the drive pulley to the shaft.
80	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws. Follow the taper lock bushing installation in the 'Taper Lock Bushing' section if a taper lock bushing is installed
90	Replace the new reducer onto the drive plate. Use proper lift procedures to avoid injury
100	Fasten the reducer to the drive plate and install the lift belts back onto the drive pulley. Tight the belt tension by adjusting the cam shafts. Ensure that the cam shafts are square..
110	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive.
120	Apply power to the motor to test the rotation and function of the new drive. If there is a problem, make the power is isolated before attempting to correct the problem
130	If everything is correct re-connect the brake release cable is one was installed on the original drive.
140	Check the fasteners are tight and belts and marked before leaving the conveyor.

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Procedure – Reducer Oil

It is important that the reducer oil is changed periodical. (See the OEM Manufacturer's Maintenance Instructions for the proper oil replacement procedure) Some reducers are sealed and do not required oil changes. (See the OEM Manufacturer's Maintenance Instructions to determine if the oil needs to be replaced)

Step	Task
	When handling oil of any sort proper Environment Protection procedures must be followed. All reducers supplied with the conveyor are supplied with a COSHH Sheet that has the identification and information about the oil contained in the reducer. Any replacement oil should have a COSHH sheet to identify the oil being installed connection has been noted and can be re-wired in the same pattern.
	Follow the End Users Environment Protection procedures when changing oil. Oil must be drained and contained in a safe area using proper equipment to drain the oil. A spill kit must be readily available in case of spillage when draining and/or refilling the reducer with oil. Do not attempt to change the oil when the reducer is mounted on the conveyor
10	When the oil is removed check the oil for metal shavings on the first change. They are created as the internal components rub together during a break in period and are normal
20	Check the oil shortly after the oil has been changed to ensure there is no presents of metal shavings. If there are metal shaving change the reducer because there is probably some wrong internally with the reducer
30	Return the reducer to the OEM manufacturer for a repair. If under warranty return the Acme Corp for a warranty claim service

Procedure – CAM Block and CAM Replacement

Replacement of the Cam Block and Cam should only be done if either are damaged. If properly maintained, they should last the life of the conveyor. If either need to be replaced keep spare Cam Block in stock as this will require the minimum amount of down time to replace

Step	Task
10	Replacement of the Cam Block and Cam should only be done if either are damaged. If properly maintained, they should last the life of the conveyor. If either need to be replaced keep spare Cam Block in stock as this will require the minimum amount of down time to replace
20	Follow the End Users Environment Protection procedures when changing oil. Oil must be drained and contained in a safe area using proper equipment to drain the oil. A spill kit must be readily available in case of spillage when draining and/or refilling the reducer with oil. Do not attempt to change the oil when the reducer is mounted on the conveyor
	Risk of Personal injury and damaging the equipment. It is important to ensure the PRB supports are secured in the down position because there will be nothing to hold the PRB bed from falling once the lift drive motor is removed. Also, the cam shaft are moved to release the tension on the lifting belts.
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work.
30	Remove the cam cover on the outside on the side channel. There are (2) bolts that hold the cam cover in place. This will expose the cam and block

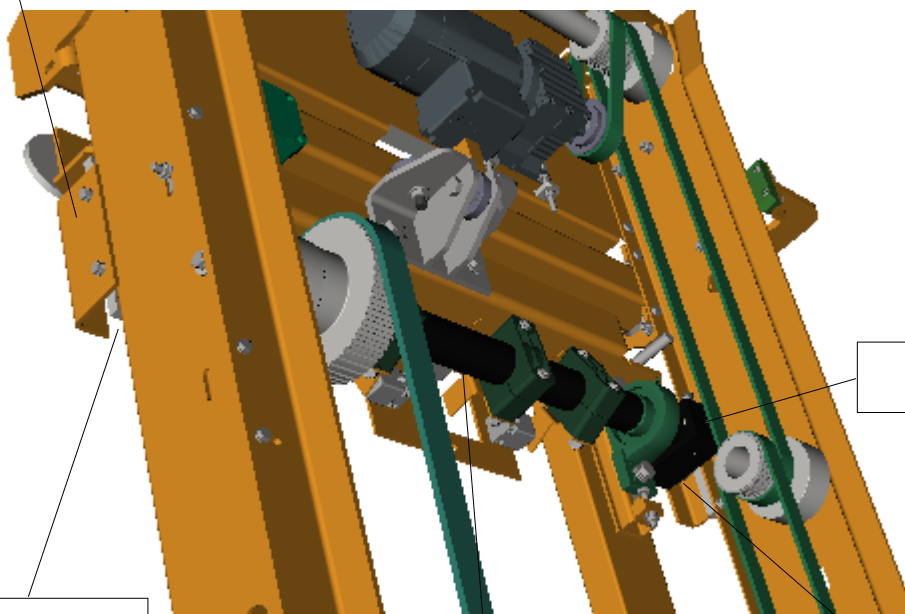
CAM cover

Cam wear bar

Cam shaft

Cam roller

Cam block



40	Return to the PRB Support leg nearest to the cam block to be removed. Check the cam to see if it is engaged with the wear bar. If the cam is pressing against the wear bar increase the elevation of the PRB Support Leg.
50	Loosen the top nut on the support foot pad adjustment screw leaving a 2mm gap. Tighten the lower nut to increase the PRB support leg height. This should release pressure on the cam and allow the cam block to be removed.
60	To remove the cam block loosen the grub (set) screws on the cam block that fasten the cam block to the cam shaft
70	Tap the cam block gently with a rubber mallet (hammer) to encourage the cam block off the cam shaft. Do not lose the key
80	Before installing the new cam block check the wear bar for any visible damage. If there is any grooving or damage replace the wear bar.
90	Install the new Cam Block onto the cam shaft and tighten the grub (set) screw to secure the cam block to the shaft. It is a good working practise to apply an anti-seize lubricant to the cam shaft prior to installing the cam block. This will prevent rusting and seizing the cam block to the shaft. Cam Wear Bar Cam Shaft Cam Block Cam Roller Cam Cover
100	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws.
110	Once the cam block is securely fastened to the cam shaft, replace the cam cover(s).

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	Tighten the fastening bolts.
120	Return the PRB support leg back to the original position, lowering or decreasing height, so that the new cam is engaged with the wear strip. Tighten the upper nut to lock the elevation of the support once adjusted.
130	Check that the PRB bed is still level and all (4) cams are engaged with the wear strip. If not, adjust the PRB support to level the PRB bed. Check the cams are still engaged with the wear strip.
140	If all (4) cams are engaged with the wear bar and the PRB bed is level. Retract the PRB Support Legs to their home positions.
150	Using the lifting drive, in manual mode, to rotate the cam blocks to ensure that the lifting sequence is functioning correctly.
160	If there are no problems, match mark all the fasteners before leaving the Cam Lift Conveyor.


Procedure – Cam Replacement

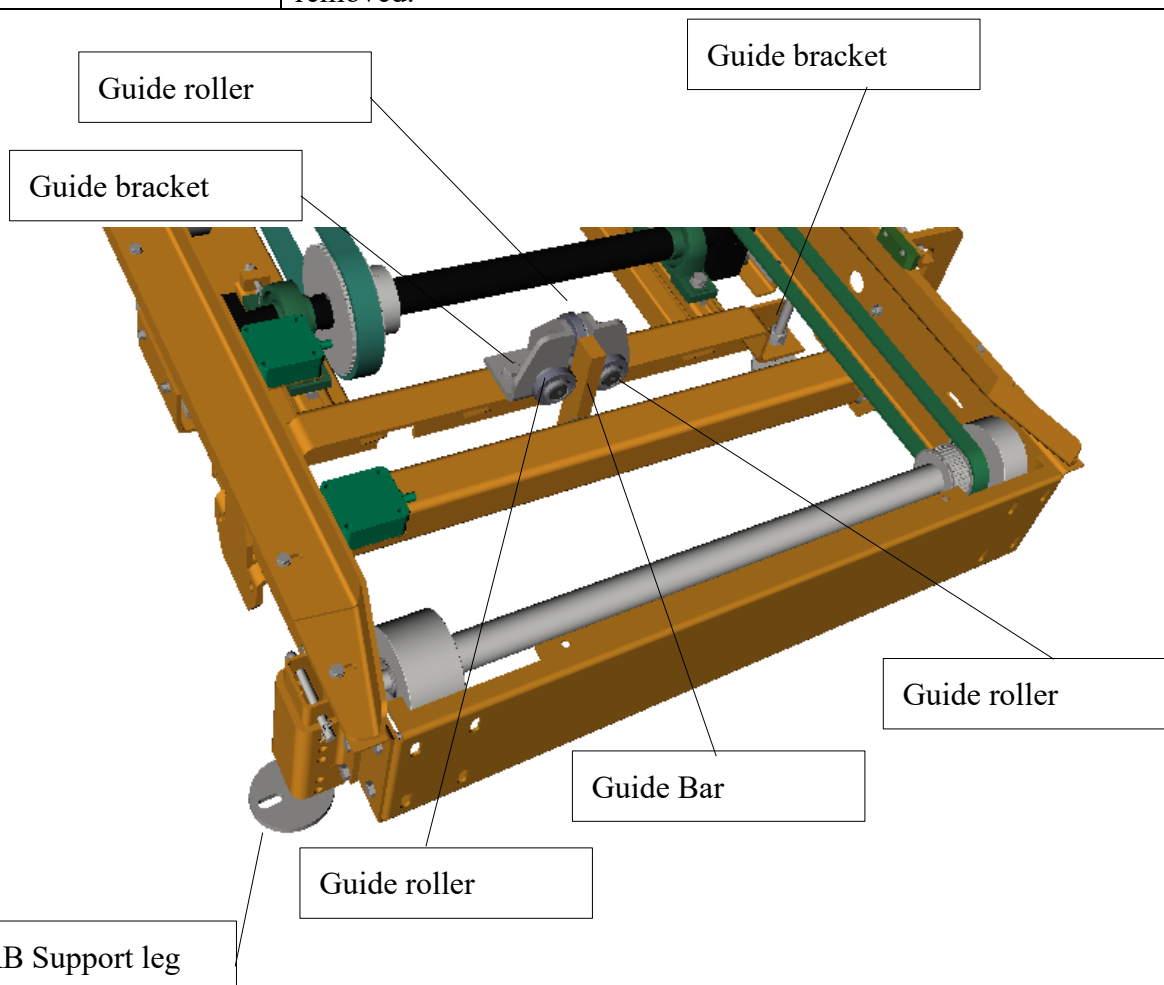
Following the removal of the cam block procedure, take the cam block to a clean solid work surface. Using the correct tools remove the cam from the cam block and replace with new. When fastening the new cam to the cam block ensure that the fasteners are tightened to the correct torque setting and match marked.

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Procedure – Belt Tracking

Replacement of the Guide Roller should only be done if either are damaged. If properly maintained, they should last the life of the conveyor.

Step	Task
10	Raise the PRB bed to its highest elevation. This will improve the access to the Guide Rollers.
20	Once the PRB bed is in its highest position, set the PRB Support legs to the floor and lock in place. (see PRB Conveyor Support section)
	Risk of Personal injury and damaging the equipment. It is important to ensure the PRB supports are secured in the down position because there will be nothing to hold the PRB bed from shifting once the lift guide is removed.





30	Once the PRB Support legs are in place and locked, the guide roller(s) can be removed
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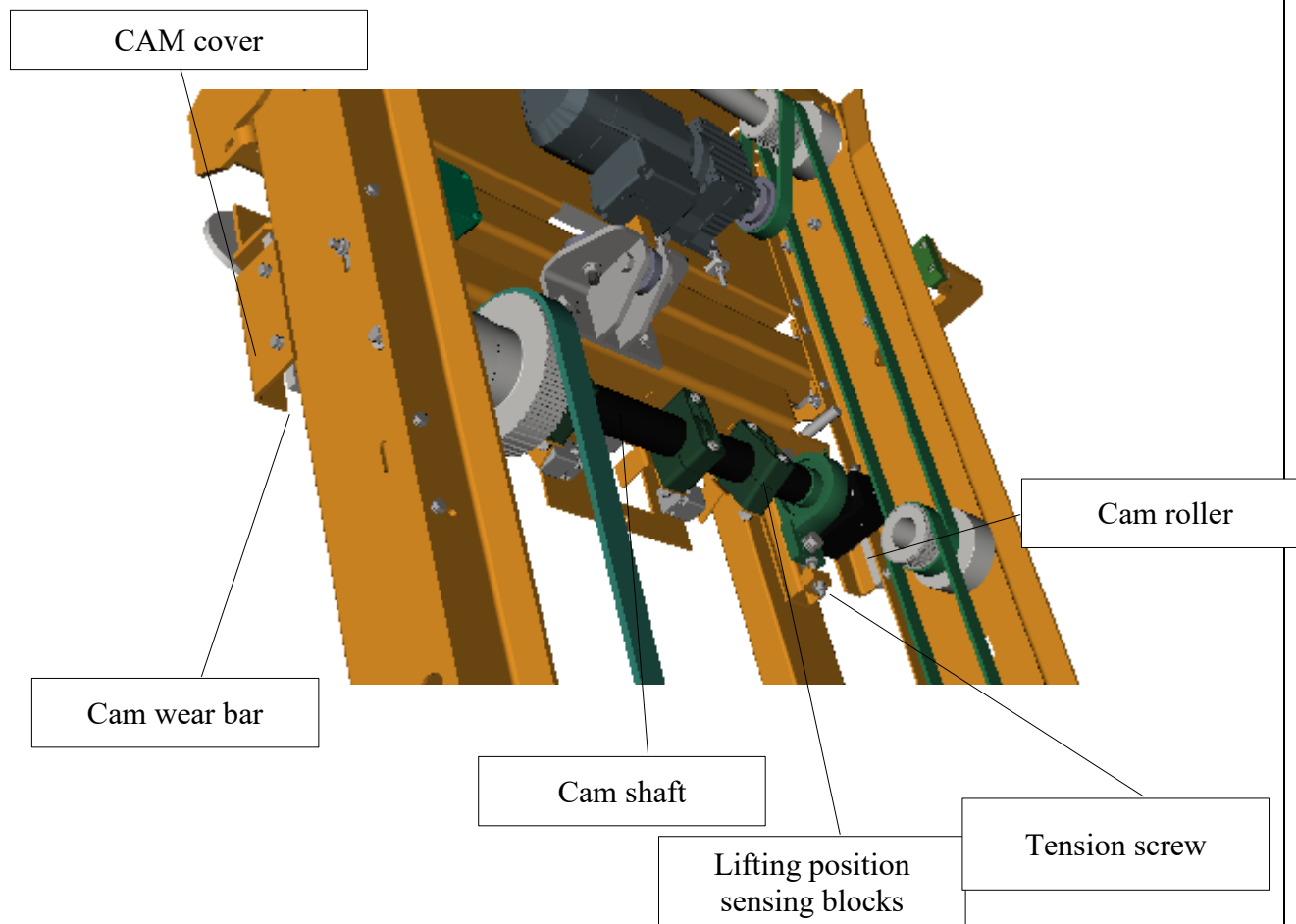
40	Using the correct tools, loosen the fasteners that secure the guide roller(s) in their mounting brackets
50	Once the fasteners are removed the guide roller(s) can be replaced with new roller(s).
60	When fastening the new Guide Roller(s) to the guide brackets ensure that the fasteners are tighten to the correct torque setting and match marked.
70	If all Guide Roller(s) are engaged with the wear bar and the PRB bed is level. Retract the PRB Support Legs to their home positions
80	Using the lifting drive, in manual mode, lift the PRB bed to ensure that the lifting sequence is functioning correctly
90	if there are no problems, match mark all the fasteners before leaving the Cam Lift Conveyor..

Procedure – Belt Tracking

If there is a failure of the pillow block, lift driven pulley or damage to the cam shaft our recommendation is to replace the cam shaft with a pre-assembled cam shaft. The cam blocks and cam can be swapped between shafts and there is no need to replace these components when replacing the cam shaft

Step	Task
10	Raise the PRB bed to its highest elevation. This will improve the access to the Cam Shaft.
20	Once the PRB bed is in its highest position, set the PRB Support legs to the floor and lock in place. (see PRB Conveyor Support section)
	Risk of Personal injury and damaging the equipment. It is important to ensure the PRB supports are secured in the down position because there will be nothing to hold the PRB bed from shifting once the cams and cam shaft are moved.
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work

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30	Remove the (2) CAM covers on the outside on the side channels on opposite sides of the cam lift. There are (2) bolts that hold the cam cover in place. This will expose the cam and block
40	Return to the PRB Support legs where the cam covers have been removed. Check the cam to see if it is engaged with the wear bar. If the cam is pressing against the wear bar increase the elevation of the PRB Support Leg
50	Loosen the top nut on the support foot pad adjustment screw leaving a 2mm gap. Tighten the lower nut to increase the PRB support leg height. This should release pressure on the cam and allow the cam block to be removed
60	To remove the cam block loosen the grub (set) screws on the cam block that fasten the cam block to the cam shaft
Note: If there is clear access to the cam lift conveyor, the cam blocks can be swapped between the old cam shaft and new cam shaft when the old cam shaft is removed	
70	Tap the cam block gently with a rubber mallet (hammer) to encourage the cam block off the cam shaft. Do not lose the key.
80	Before installing the new cam block check the wear bar for any visible damage. If there is any grooving or damage replace the wear bar
90	Loosen the fastening bolt on the pillow block bearings that support the cam

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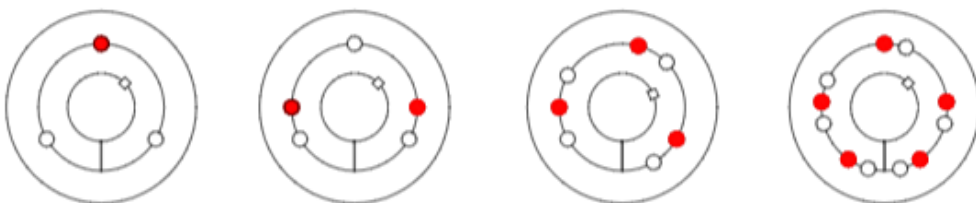
	shaft. Release the tension on the lifting belt by turning the tension screws with the correct tools.
100	When the tension is released slip the lifting belt off the driven pulley
110	Remove the fastening bolts that hold the pillow block bearings to the mounting rails and remove the cam shaft. The lifting belt will have to be slipped over the pillow blocks when removing the cam shaft. Ensure that proper lifting procedures are followed in order to avoid injury.
120	Place the existing cam shaft on the floor and mount the new cam shaft onto the pillow block rails. Make sure to slip the lifting belt onto the new cam shaft before fastening down
130	Check the position of the new cam shaft with respect to either side of the lifting base frame. Make sure that when the cam block are re-installed the cams are in proper contact with the wear bar and will not bind against the cam covers
140	Check the alignment of the lifting driven pulley. Place a straight edge across the face of the drive pulley and face of the drive pulley. There are no visible gaps and the straight edge lies flat across both faces.
150	Loosely fasten the pillow block bearings to the mounting rails. If the pillow block bearings do not align with the mounting rails they will have to be adjusted.
Note: When aligning each component on the new cam shaft the grub (set) screws will have to be loosened and then tightened after the component is aligned. We recommend that the use of a mild-strength locking adhesive to secure the grub screw in place.	
160	If this cam shaft has the lifting position sensing plates attached, the sensing plates will need to be removed from the old cam shaft and installed onto the new cam shaft. The sensing plate mounting blocks split into halves and can be easily transferred to the new cam shaft
170	Remove the bolts in the top of the sensing block to split the sensing block in half. Transfer the sensing block to the new cam shaft and tighten the fastening bolts. Make sure that the position of the sensing plate is the same as it was on the old cam shaft
180	When new cam shaft is seated on the mounting rails adjust the tension to lifting belt by turning the tensioning screw. Ensure that the new cam shaft is square to the lifting base frame
190	Install the Cam Block onto the cam shaft and tighten the grub (set) screw to secure the cam block to the shaft. It is a good working practice to apply an anti-seize lubricant to the cam shaft prior to installing the cam block. This will prevent rusting and seizing the cam block to the shaft.
200	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws.
210	Once the cam block is securely fastened to the cam shaft, replace the cam cover(s). Tighten the fastening bolts.
220	Return the PRB support leg back to the original position, lowering or decreasing height, so that the new cam is engaged with the wear strip. Tighten the upper nut to lock the elevation of the support once adjusted.


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230	Check that the PRB bed is still level and all (4) cams are engaged with the wear strip. If not, adjust the PRB support to level the PRB bed. Check the cams are still engaged with the wear strip.
240	If all (4) cams are engaged with the wear bar and the PRB bed is level. Retract the PRB Support Legs to their home positions.
250	Using the lifting drive, in manual mode, to rotate the cam shaft to ensure that the lifting sequence is functioning correctly.
260	If there are no problems, match mark all the fasteners before leaving the Cam Lift Conveyor.

Procedure - Taper lock Bushing	
Taper lock Bushing are used to secure the sprockets and/or pulleys to shafts. This is a generic procedure that applies to all taper lock bushing with grub (set) screws.	
Step	Task
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work.
10	If the taper lock bushing is used in the pulley mounted on the motor/reducer follow the removal procedure.
 <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 1008 TO 3030 3535 TO 6050 7060 TO 10085 120100 </div>	
20	Remove all the screws holding the bushing in place.
30	Insert a screw(s) in bushing hole(s) marked 'Red' circle to loosen the bushing, alternating the tightening of the screws.

Procedure - Taper lock Bushing Replacement	
Step	Task
10	Clean the shaft, bore of the bushing, outside of the bushing and hub bore of all oil, paint and dirt. File any burrs
20	Insert the bushing into the hub. Match the hole patterns, not the threaded holes (each completed hole will be threaded on one side only)
Note: If two bushing are used on the same component and shaft, fully tighten one bushing before working on the other	
	Do not lubricate the bushing taper, bushing bore, hub taper or shaft. Doing so could result in breakage of the product
30	Lightly oil the grub (set) screws and thread them into those half-threaded holes indicated by the 'RED' circle

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Do not use worn Hex Key wrenches. Doing so may result in a loose assembly or may damage the screws

40

Position assembly on the shaft allowing for the axial movement which will occur during the tightening process

50

Alternately torque the grub (set) screws to the recommended torque setting

Note: When installing bushing in sintered steel product (such as a sheave, coupling, etc.), follow torque recommendations on the product if present.



Where bushing are used with lubricated products such as chains, gears, grid couplings, be sure to seal all pathways (where lubrication could leak) with RTV or similar material

60

To increase the gripping force, hammer the face of the bushing using a drift or sleeve

70

Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose

Note: Do not hit the bushing directly with a hammer or any blunt objects.

Brush Number	Torque (lb/in)	Torque(lb/ft)
1008,1108	55	4.6
1210,1215,1310	175	14.6
1610,1615	175	14.6
2012	280	23.3
2517,2525	430	35.8
3020,3030	800	66.7
4040	1700	141.7
4545	2450	204.2
5050	3100	258.3
6050,7060,8065	7820	651.7
10085,120100	13700	1141.7

80

Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose

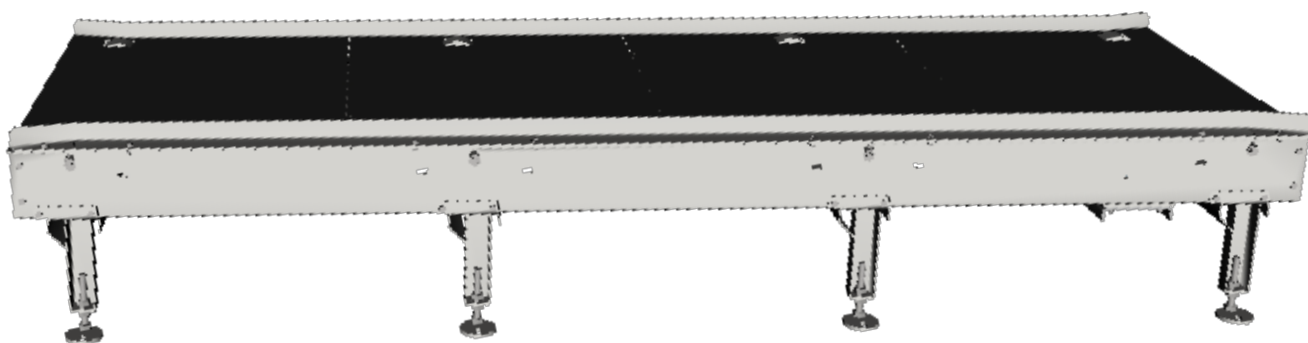
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Equipment	Summary
mullsanne PRB	General maintenance tasks



Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	Clear the 4 roller mullsanne PRB of Skids
-	Safety Shoes	System in Manual
-	Bump Cap	


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After a few weeks of operation, the belts must be checked for tension and alignment. Belts must be tight between rollers in order that they do not jump teeth. Ensure that the belts are tracking correctly. Check the drive belt tension and tracking. It is important that the drive belt is tensioned correctly in order that it does not jump teeth.

Note: Do not over tension the belts. Excessive tension will require additional power to drive the rollers and cause the motor to overheat and electrical fault. There should be approximately 10mm of flexibility in the belt when tensioned correctly.


Procedure – Belt Tracking

Belt tracking should be adjusted when a belt wanders off centre. If a belt wanders off centre but returns or if a belt wanders off centre but does not rub on the edges of the pulley, no tracking is required.

Step	Task
10	Check the belts to make sure they are not rubbing against anything and there is no noise coming from the belts.
20	Check the belt for proper tension when the conveyor is running with a normal load of product. It should not slip / jump teeth.
30	Make sure the rollers are aligned and the conveyor is level
40	Make sure the drive is square to the drive roller
50	Make sure all rollers are tightened correctly to the side channel
	If a belt is miss-tracking, it could result in the belt not being carried the sprocket. Tracking belt should be done with two people in order that the conveyor can be shut off if the belt begins tracking incorrectly or starts to come off the pulley
60	Turn the conveyor on and watch the belts as they rotate the rollers. Ensure that all belts are tracking correctly before leaving the conveyor.

Procedure – Belt Tracking

Belt tracking should be adjusted when a belt wanders off centre. If a belt wanders off centre but returns or if a belt wanders off centre but does not rub on the edges of the pulley, no tracking is required.

Step	Task
10	Check the belts to make sure they are not rubbing against anything and there is no noise coming from the belts
20	Check the belt for proper tension when the conveyor is running with a normal load of product. It should not slip / jump teeth
30	Make sure the rollers are aligned and the conveyor is level.
40	Make sure the drive is square to the drive roller
50	Make sure all rollers are tightened correctly to the side channel
	If a belt is miss-tracking, it could result in the belt not being carried the sprocket. Tracking belts should be done with two people in order that the conveyor can be shut off if the belt begins tracking incorrectly or starts to come off the sprocket. Risk to personal injury as the belt must be operated in close proximity. Risk of the belt catching on loose clothing.

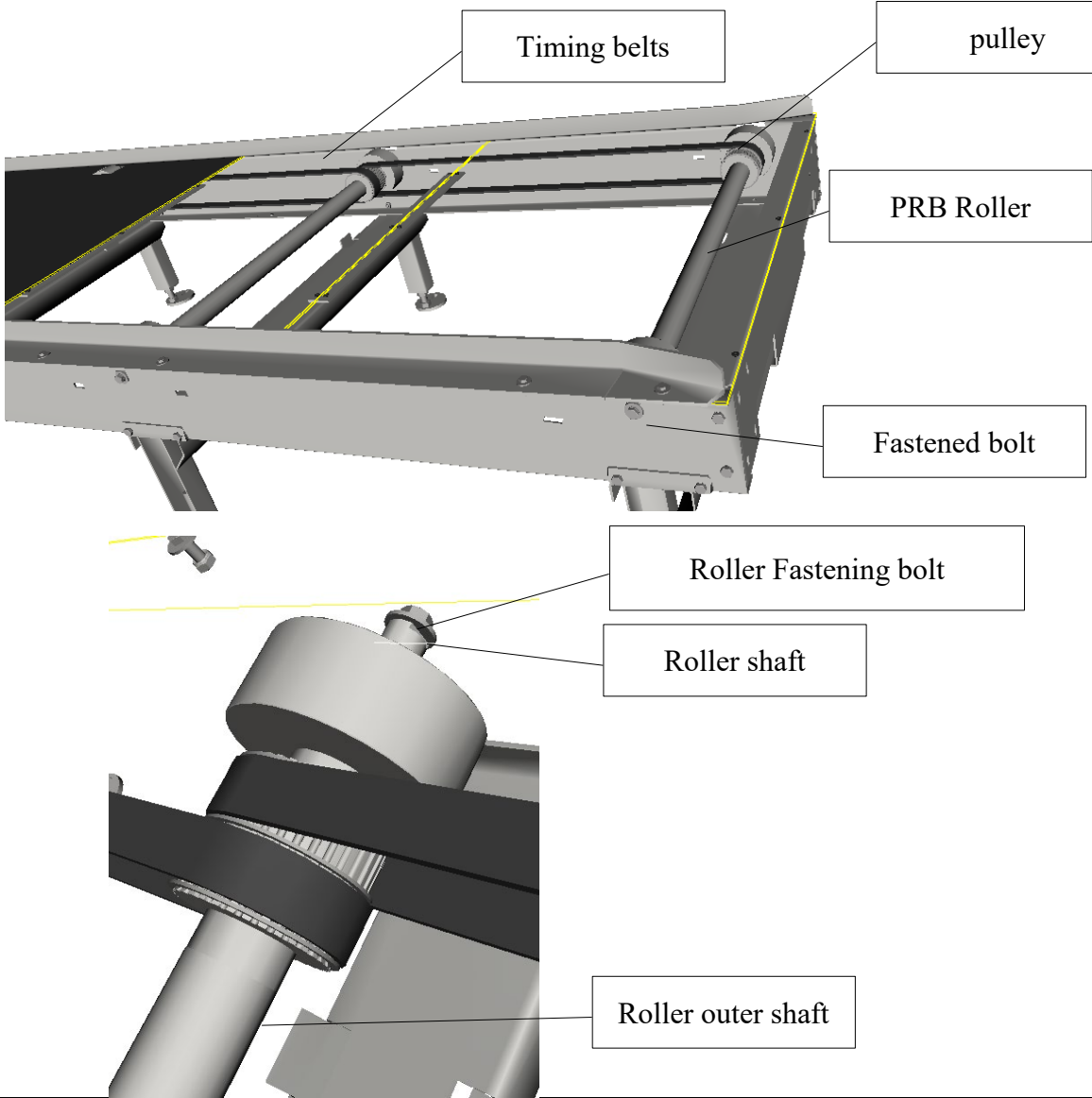

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50	Turn the conveyor on and watch the belts as they rotate around the rollers
60	Ensure that all belts are tracking correctly before leaving the conveyor.

Procedure – Belt Replacement

When a belt needs to be replaced follow the following steps to replace the belt;

Step	Task
	
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Identify the belt that needs to be replaced. Check the manual to ensure that the correct replacement belt has been selected as the replacement
20	Check the identification marking on the belt (if still visible) to compare against the replacement belt

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Note: The belt size and length has been specifically selected for the application of the conveyor (Speed, Product weight, operations, etc.) Do not substitute an inferior belt because it may not fit and/or provide the strength required for the application

30	Loosen the bolts on both ends of the roller in order to remove the keep plates and remove the keep plates. Once loosen lift the roller so that it can be move laterally in the side channel hole. Push the roller end with the pulleys towards the side channel in order to expose the other end so that the roller can be lifted up.
40	When the roller is removed from the holes twist the roller to slacken the belts. Slip the belts off the roller..
50	Repeat the same procedure with the adjacent roller one which the belt is to be replaced.
60	Slip the belts off the rollers.
70	Insert the replacement belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern.
80	Re-insert the rollers into the side channels and fasten the keep plates to both ends of the roller to lock the roller in place.
90	Check the belt tension and tracking before leaving the conveyor.

Procedure – Belt Replacement

When a belt needs to be replaced follow the following steps to replace the belt;

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work.
20	Loosen the bolts that hold the drive in place on the drive mounting plate. Once loosen back off the tension bolts that are used to tension the drive belt
30	When the drive tension has been released slip the drive belt off the drive pulley.
40	Follow the same procedure for removing a roller (See the Belt Replacement Section) to remove the drive roller. If the drive belt snapped the roller will still need to be removed.
50	When the roller is removed slip the roller belt off followed by removing the drive belt
60	Insert the replacement drive belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern.
70	Insert the roller to roller belt over the pulley and install the roller back into the side channel.
80	Pull the drive back to apply tension to the drive belt, then tighten the tension bolts to apply additional tension to the drive pulley.
90	When the tension is sufficient tighten the drive mounting bolts. Ensure that the drive is square to the drive roller, use a straight edge to check the alignment.
100	Release the brake on the drive to turn the drive roller and check the alignment. If everything seems ok apply power to perform the final check.
110	Check the tension of the belt when the conveyor drive is under load and the belt tracking. If the drive belt jumps apply additional tension. If the tracking is not correct adjust the

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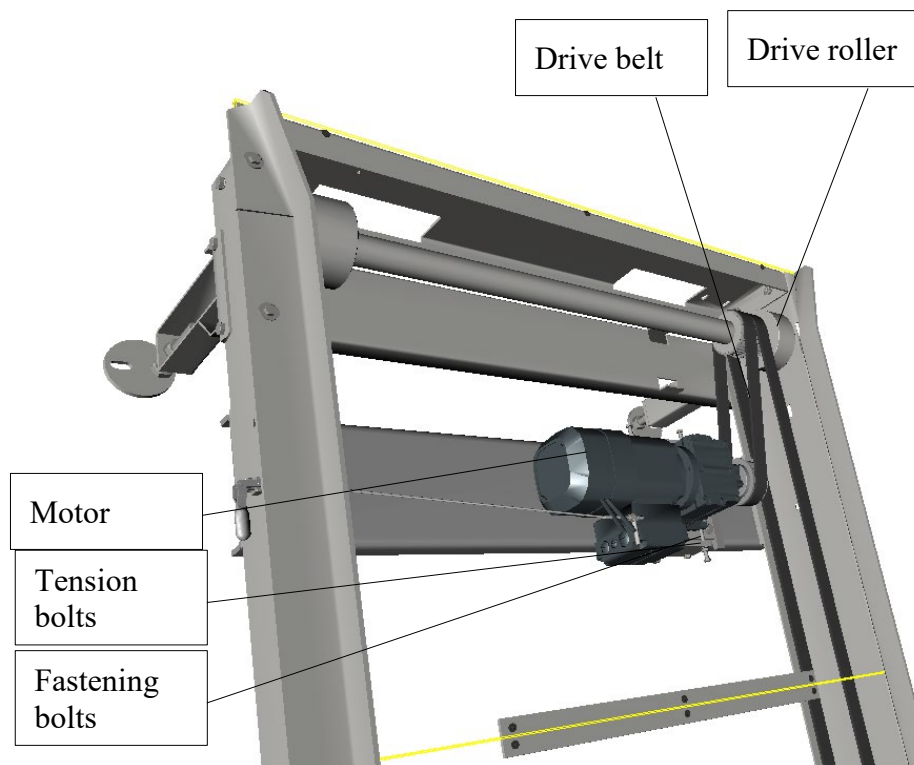
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drive tension bolts to adjust the tracking of the drive belt

120

Ensure the drive is performing correctly before leaving the conveyor.



Procedure – Motor and Reducer Replacement

In most applications the motor and reducer will have been supplied as a gearmotor, which is a single unit. In the rare application where the motor and reducer are supplied as separate units see the appropriate OEM manufacturer's instructions for the replacement of the motor. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. To remove the reducer follow the following instructions.

Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before disconnecting the electrical wiring. Make sure the electrical wiring connection has been noted and can be re-wired in the same pattern.
Note: Some drives are wired through special connection terminal covers. Ensure that the replacement drive is suitable for the current application and wiring	
10	When the drive tension has been released slip the drive belt off the drive pulley.
20	Follow the same procedure for removing a roller (See the Belt Replacement Section) to remove the drive roller. If the drive belt snapped the roller will still need to be removed.
30	When the roller is removed slip the roller belt off followed by removing the drive belt

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40	Insert the replacement drive belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern.
50	Insert the roller to roller belt over the pulley and install the roller back into the side channel.
60	Pull the drive back to apply tension to the drive belt, then tighten the tension bolts to apply additional tension to the drive pulley.
70	When the tension is sufficient tighten the drive mounting bolts. Ensure that the drive is square to the drive roller, use a straight edge to check the alignment.
80	Release the brake on the drive to turn the drive roller and check the alignment. If everything seems ok apply power to perform the final check.
90	Check the tension of the belt when the conveyor drive is under load and the belt tracking. If the drive belt jumps apply additional tension. If the tracking is not correct adjust the drive tension bolts to adjust the tracking of the drive belt
100	Ensure the drive is performing correctly before leaving the conveyor.
110	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive
120	Apply power to the motor to test the rotation and function of the new drive. If there is a problem, make the power is isolated before attempting to correct the problem
130	If everything is correct re-connect the brake release cable is one was installed on the original drive

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Procedure – reducer oil

It is important that the reducer oil is changed periodical. (See the OEM Manufacturer's Maintenance Instructions for the proper oil replacement procedure) Some reducers are sealed and do not required oil changes. (See the OEM Manufacturer's Maintenance Instructions to determine if the oil needs to be replaced)


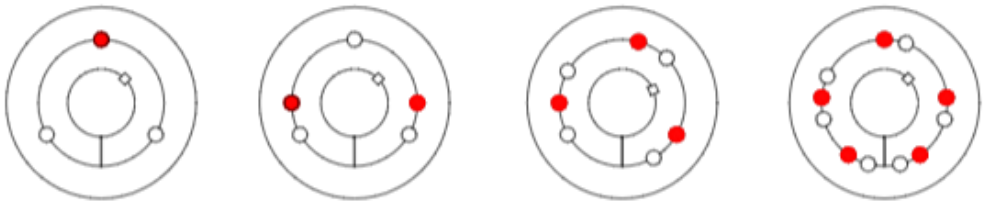
If the oil does need to be replaced follow the same procedures for replacing the motor / reducer to remove the reducer from the conveyor

Step	Task
	Note: When handling oil of any sort proper Environment Protection procedures must be followed. All reducers supplied with the conveyor are supplied with a COSHH Sheet that has the identification and information about the oil contained in the reducer. Any replacement oil should have a COSHH sheet to identify the oil being installed
	Follow the End Users Environment Protection procedures when changing oil. Oil must be drained and contained in a safe area using proper equipment to drain the oil. A spill kit must be ready available in case of spillage when draining and/or refilling the reducer with oil. Do not attempt to change the oil when the reducer is mounted on the conveyor.
10	When the oil is removed check the oil for metal shavings on the first change. They are created as the internal components rub together during a break in period and are normal
20	Check the oil shortly after the oil has been changed to ensure there is no presents of metal shavings. If there are metal shaving change the reducer because there is probably some wrong internally with the reducer.
30	Return the reducer to the OEM manufacturer for a repair. If under warranty return the Acme Corp for a warranty claim service.




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Procedure - Taper lock Bushing

Taper lock Bushing are used to secure the sprockets and/or pulleys to shafts. This is a generic procedure that applies to all taper lock bushing with grub (set) screws.

Step	Task
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work.
10	If the taper lock bushing is used in the pulley mounted on the motor/reducer follow the removal procedure.
 <div style="display: flex; justify-content: space-around; margin-top: 10px;"> 1008 TO 3030 3535 TO 6050 7060 TO 10085 120100 </div>	
20	Remove all the screws holding the bushing in place.
30	Insert a screw(s) in bushing hole(s) marked 'Red' circle to loosen the bushing, alternating the tightening of the screws.

Procedure - Taper lock Bushing Replacement

Step	Task
10	Clean the shaft, bore of the bushing, outside of the bushing and hub bore of all oil, paint and dirt. File any burrs
20	Insert the bushing into the hub. Match the hole patterns, not the threaded holes (each completed hole will be threaded on one side only)
Note: If two bushing are used on the same component and shaft, fully tighten one bushing before working on the other	
	Do not lubricate the bushing taper, bushing bore, hub taper or shaft. Doing so could result in breakage of the product
30	Lightly oil the grub (set) screws and thread them into those half-threaded holes indicated by the 'RED' circle
	Do not use worn Hex Key wrenches. Doing so may result in a loose assembly or may damage the screws
40	Position assembly on the shaft allowing for the axial movement which will occur during the tightening process
50	Alternately torque the grub (set) screws to the recommended torque setting
Note: When installing bushing in sintered steel product (such as a sheave, coupling, etc.), follow torque recommendations on the product if present.	
	Where bushing are used with lubricated products such as chains, gears, grid couplings, be sure to seal all pathways (where lubrication could leak) with RTV or similar material

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60	To increase the gripping force, hammer the face of the bushing using a drift or sleeve
70	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose

Note: Do not hit the bushing directly with a hammer or any blunt objects.

Brush Number	Torque (lb/in)	Torque(lb/ft)
1008,1108	55	4.6
1210,1215,1310	175	14.6
1610,1615	175	14.6
2012	280	23.3
2517,2525	430	35.8
3020,3030	800	66.7
4040	1700	141.7
4545	2450	204.2
5050	3100	258.3
6050,7060,8065	7820	651.7
10085,120100	13700	1141.7

80	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose
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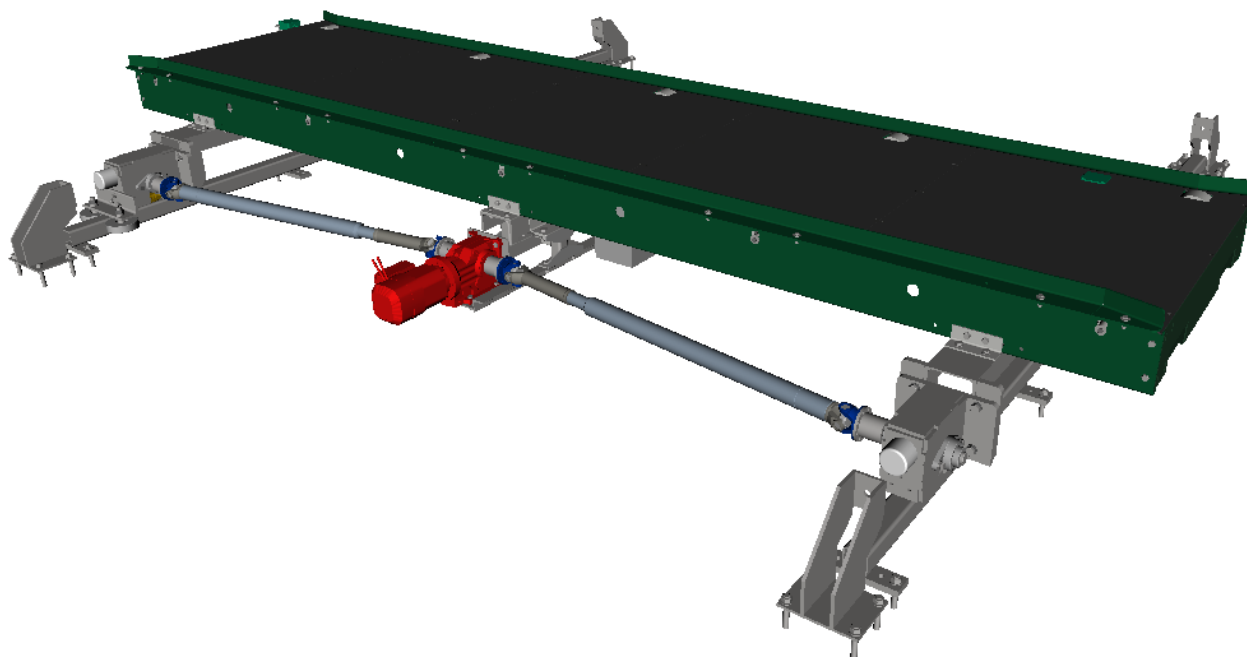
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Equipment	Summary
Shuttle PRB	General maintenance tasks



Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	Clear the equipment of Skids
-	Safety Shoes	System in Manual
-	Bump Cap	

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After a few weeks of operation, the chains must be checked for tension and alignment. Chains must be adjusted to the correct tension to prevent surging and they do not jump teeth. Ensure that the chains are tracking correctly.

Step

Task

Note: Do not over tension the chains. Excessive tension will require additional power to drive and potentially cause the motor to overheat and electrical fault. There should be approximately 10mm of flexibility in the drive chain when tensioned correctly.

Procedure – Belt Tracking

Belt tracking should be adjusted when a belt wanders off centre. If a belt wanders off centre but returns or if a belt wanders off centre but does not rub on the edges of the pulley, no tracking is required.

Step

Task

10

Check the belts to make sure they are not rubbing against anything and there is no noise coming from the belts.

20

Check the belt for proper tension when the conveyor is running with a normal load of product. It should not slip / jump teeth.

30

Make sure the rollers are aligned and the conveyor is level

40

Make sure the drive is square to the drive roller

50

Make sure all rollers are tightened correctly to the side channel



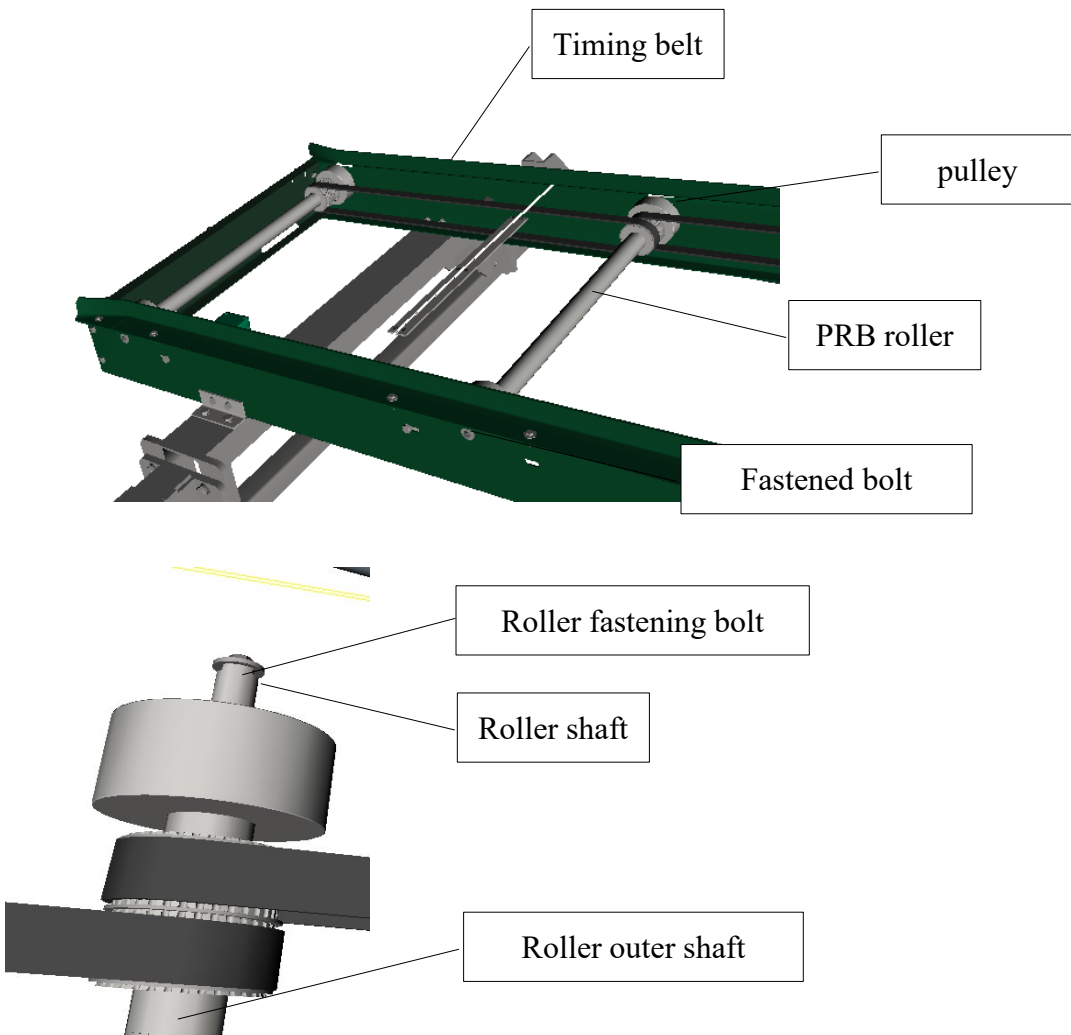

If a belt is miss-tracking, it could result in the belt not being carried the sprocket. Tracking belt should be done with two people in order that the conveyor can be shut off if the belt begins tracking incorrectly or starts to come off the pulley

60

Turn the conveyor on and watch the belts as they rotate the rollers. Ensure that all belts are tracking correctly before leaving the conveyor.


Procedure – Belt replacement

When a belt needs to be replaced follow the following steps to replace the belt

Step	Task
 <p>The diagram illustrates the components of a conveyor belt system. The top part shows a perspective view of a green timing belt looped around a pulley and supported by PRB rollers. A fastened bolt is shown securing the belt. The bottom part is a detailed view of a roller assembly, showing a roller fastening bolt, a roller shaft, and a roller outer shaft.</p>	
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Identify the belt that needs to be replaced. Check the manual to ensure that the correct replacement belt has been selected as the replacement
20	Check the identification marking on the belt (if still visible) to compare against the replacement belt.
Note: The belt size and length has been specifically selected for the application of the conveyor (Speed, Product weight, operations, etc.) Do not substitute an inferior belt because it may not fit and/or provide the strength required for the application.	
30	Loosen the bolts on both ends of the roller in order to remove the keep plates and remove the keep plates. Once loosen lift the roller so that it can be move laterally in the side channel hole. Push the roller end with the pulleys towards the side channel in order to

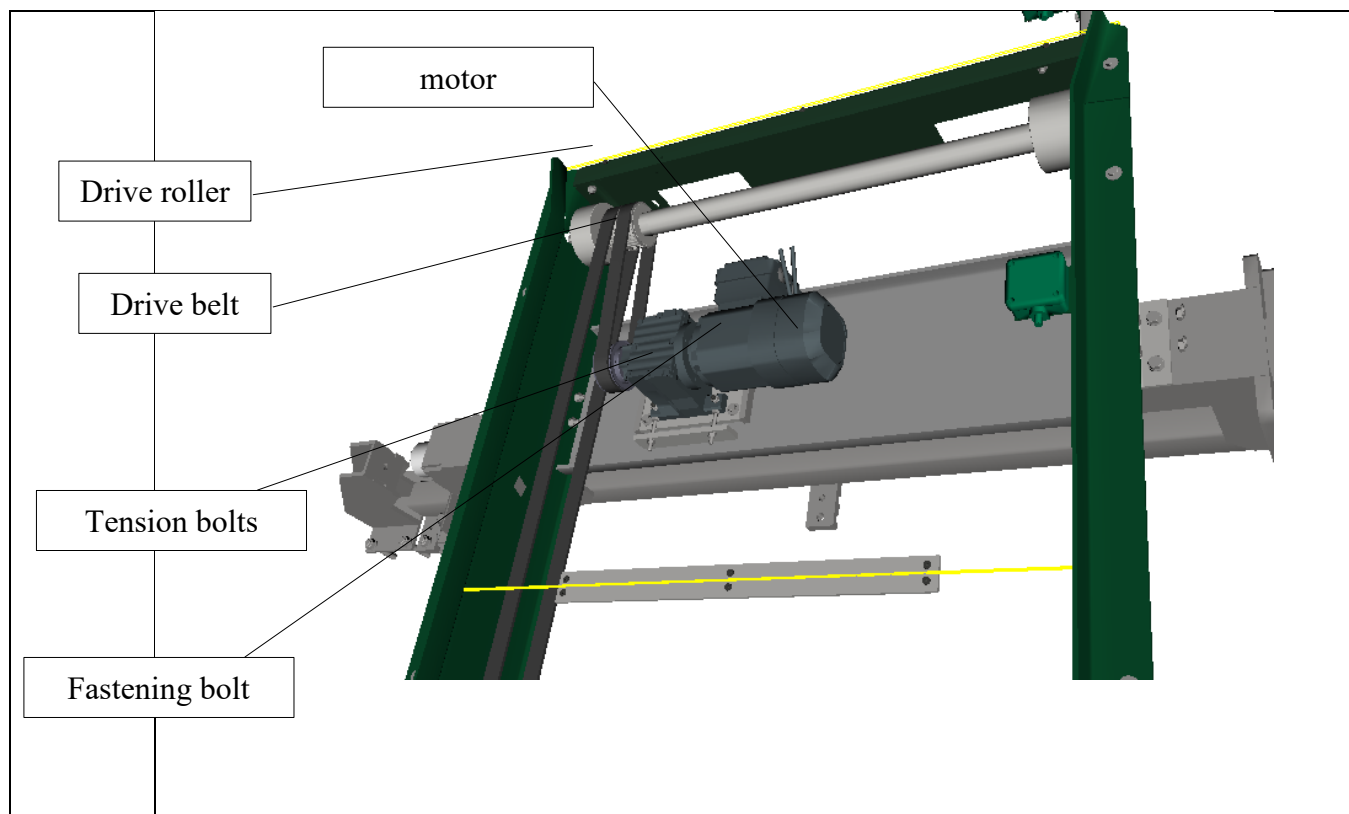
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	expose the other end so that the roller can be lifted up.
40	When the roller is removed from the holes twist the roller to slacken the belts. Slip the belts off the roller
50	Repeat the same procedure with the adjacent roller one which the belt is to be replaced
60	Slip the belts off the rollers
70	Insert the replacement belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern.
80	Re-insert the rollers into the side channels and fasten the keep plates to both ends of the roller to lock the roller in place
90	Check the belt tension and tracking before leaving the conveyor.

Procedure – Belt replacement	
When the drive belt needs to be replaced proceed following this guide to replace the drive belt;	
Step	task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing with any work
20	Loosen the bolts that hold the drive in place on the drive mounting plate. Once loosen back off the tension bolts that are used to tension the drive belt
30	When the drive tension has been released slip the drive belt off the drive pulley.
40	Follow the same procedure for removing a roller (See the Belt Replacement Section) to remove the drive roller. If the drive belt snapped the roller will still need to be removed
50	When the roller is removed slip the roller belt off followed by removing the drive belt.
60	Insert the replacement drive belt over the roller pulley, making sure that it is placed in the same position as the previous belt maintaining the same roller to roller assembly pattern.
70	Insert the roller to roller belt over the pulley and install the roller back into the side channel
80	Pull the drive back to apply tension to the drive belt, then tighten the tension bolts to apply additional tension to the drive pulley
90	When the tension is enough, tighten the drive mounting bolts. Ensure that the drive is square to the drive roller, use a straight edge to check the alignment
100	Release the brake on the drive to turn the drive roller and check the alignment. If everything seems ok apply power to perform the final check
110	Check the tension of the belt when the conveyor drive is under load and the belt tracking. If the drive belt jumps apply additional tension. If the tracking is not correct adjust the drive tension bolts to adjust the tracking of the drive belt.
120	Ensure the drive is performing correctly before leaving the conveyor

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Procedure – Motor and Reducer Replacement

In most applications the motor and reducer will have been supplied as a gearmotor, which is a single unit. In the rare application where the motor and reducer are supplied as separate units see the appropriate OEM manufacturer's instructions for the replacement of the motor. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. To remove the reducer, follow the following instructions

Step	task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before disconnecting the electrical wiring. Make sure the electrical wiring connection has been noted and can be re-wired in the same pattern. Note: Some drives are wired through special connection terminal covers. Ensure that the replacement drive is suitable for the current application and wiring
10	Lock-off at the motor isolation switch before commencing with any works. Disconnect the wires to the motor junction box. Ensure that the wiring pattern is noted for connection to the new motor
20	Disconnect the brake release cable if one has been installed.
30	Loosen the tension from the drive belt by loosen the tension bolts on the drive mounting plate.

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40	When the drive belt tension has been loosened slip the drive belt off the drive pulley
50	Remove the bolts that fasten the reducer to the drive plate. Then lift the reducer off the drive plate. Ensure that proper lifting procedures are followed in order to avoid injury.
60	Place the reducer on the floor or a secure work surface and remove the drive pulley. In most applications the drive pulley is secure to the reducer output shaft by a taper lock bushing. (see 'Taper Lock Bushing' section)
70	Re-install the drive pulley onto the new reducer output shaft and tighten the grub (set) screws/taper lock bushing to secure the drive pulley to the shaft. It is a good working practice to apply an anti-seize lubricant to the reducer output shaft prior to installing the drive pulley. This will prevent rusting and seizing the drive pulley to the shaft.
80	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws. Follow the taper lock bushing installation in the 'Taper Lock Bushing' section if a taper lock bushing is installed.
90	Replace the new reducer onto the drive plate. Use proper lift procedures to avoid injury
100	Fasten the reducer to the drive plate and install the drive belt back onto the drive pulley. Tight the belt tension using the tensioning bolts.
110	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive
120	Apply power to the motor to test the rotation and function of the new drive. If there is a problem make the power is isolated before attempting to correct the problem
130	If everything is correct re-connect the brake release cable is one was installed on the original drive

Procedure – Reducer Oil


it is important that the reducer oil is changed periodical. (See the OEM Manufacturer's Maintenance Instructions for the proper oil replacement procedure) Some reducers are sealed and do not required oil changes. (See the OEM Manufacturer's Maintenance Instructions to determine if the oil needs to be replaced)

Step	task
	Note: When handling oil of any sort proper Environment Protection procedures must be followed. All reducers supplied with the conveyor are supplied with a COSHH Sheet that has the identification and information about the oil contained in the reducer. Any replacement oil should have a COSHH sheet to identify the oil being installed
	Follow the End Users Environment Protection procedures when changing oil. Oil must be drained and contained in a safe area using proper equipment to drain the oil. A spill kit must be ready available in case of spillage when draining and/or refilling the reducer with oil. Do not attempt to change the oil when the reducer is mounted on the conveyor.
10	When the oil is removed check the oil for metal shavings on the first change. They are created as the internal components rub together during a break in period and are normal
20	Check the oil shortly after the oil has been changed to ensure there is no presents of metal shavings. If there are metal shaving change the reducer because there is probably some wrong internally with the reducer

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Procedure – Shuttle Motor and Reducer Replacement

In this application the motor and reducer will have been supplied as a gearmotor, which is a single unit. The reducer is the part of the motor/reducer combination that is mounted to the drive plate. To remove the reducer, follow the following instructions

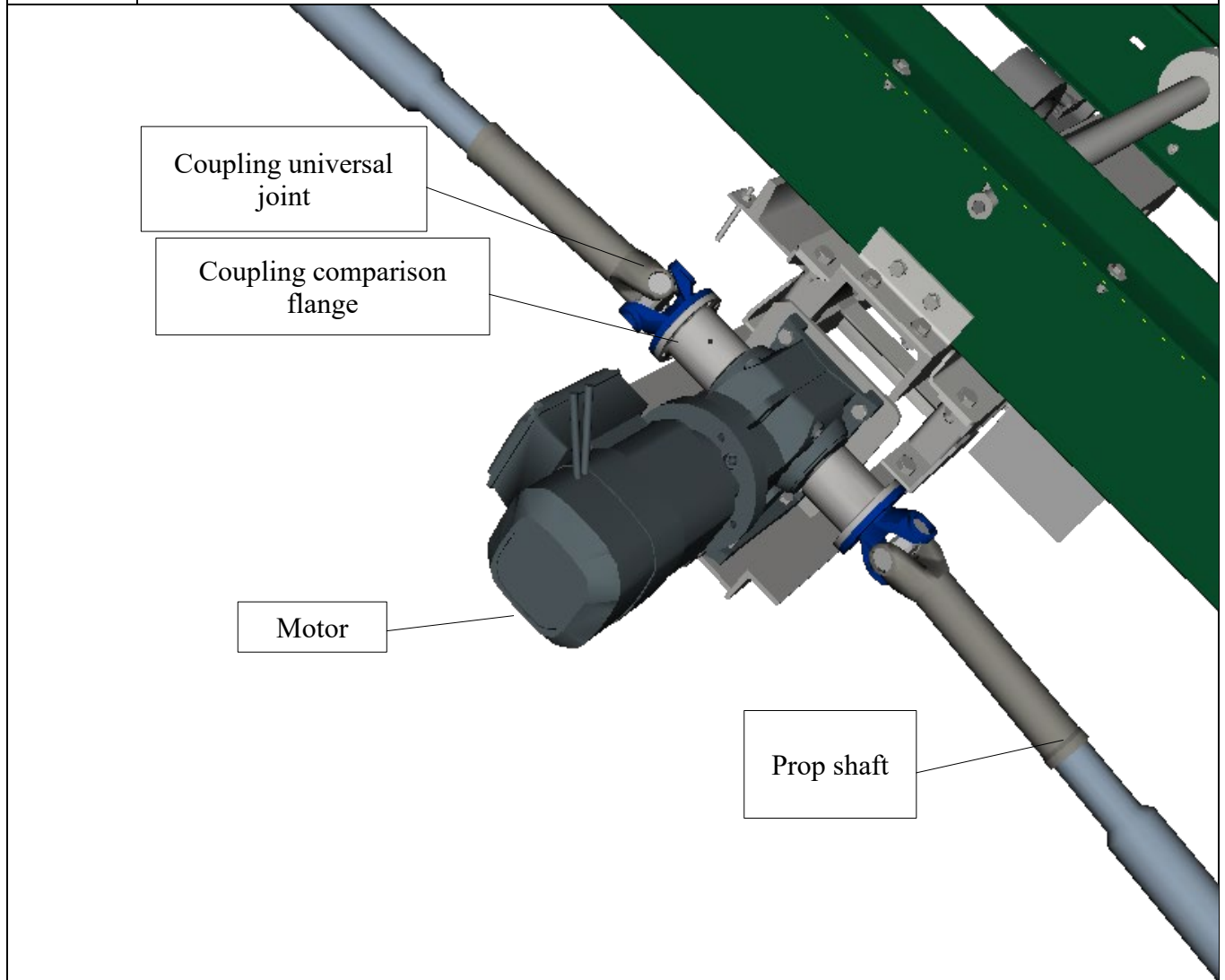
Step	Task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before disconnecting the electrical wiring. Make sure the electrical wiring connection has been noted and can be re-wired in the same pattern
<p>Note: Some drives are wired through special connection IS terminal covers. Ensure that the replacement drive is suitable for the current application and wiring.</p> <p>If an IS terminal cover has been installed on the motor terminal box.</p> <p>Remove the IS terminal cover from the terminal box but do not remove the wires. Check the terminal connections within the terminal box on the new motor to ensure they are the same connecting pattern.</p>	
20	Disconnect the brake release cable if one has been installed. Chalk the support wheels on the outer ring to prevent the shuttle from moving in either direction
30	Loosen the bolts on the prop shaft coupling. Remove the bolts in order to disconnect the prop shaft and split the coupling. Care must be taken to avoid letting the prop shaft fall when the last bolts is removed. Support the prop shaft before removing the last bolt. Ensure that proper lifting procedures are followed in order to avoid injury
40	Allow the loose end of the prop shaft to rest on the floor
50	Remove the remaining coupling from the output shaft of the motor/reducer. For a quicker replacement, have the replacement motor/reducer pre-assembled with a replacement coupling half (companion flange). This will reduce the replacement time
60	Loosen the bolts holding the motor/reducer to the mounting plate. If the motor/reducer shifts because of an imbalanced weight, make sure the motor /reducer is supported when removing the last bolt. Ensure that proper lifting procedures are followed in order to avoid injury.
70	Place the reducer on the floor or a secure work surface and remove the prop shaft coupling.
80	Re-install the prop shaft coupling onto the new reducer output shaft and tighten the grub (set) screws to secure the coupling to the output shaft. It is a good working practise to apply an anti-seize lubricant to the reducer output shaft prior to installing the coupling. This will prevent rusting and seizing the drive sprocket to the shaft.
90	Apply a mild locking adhesive to the grub (set) screws to ensure that they remain secure once tightened. Do not apply a full strength adhesive to the grub (set) screws.
100	Replace the new reducer onto the drive plate. Use proper lift procedures to avoid injury.
110	Fasten the reducer to the drive plate and install the prop shaft onto the coupling. Use proper lift procedures to avoid injury
120	Re-connect the electrical wiring following the same electrical wiring noted when disconnecting the original drive

130

Apply power to the motor to test the rotation and function of the new drive. If there is a problem, make the power is isolated before attempting to correct the problem.

140

If everything is correct, re-connect the brake release cable that was installed on the original drive




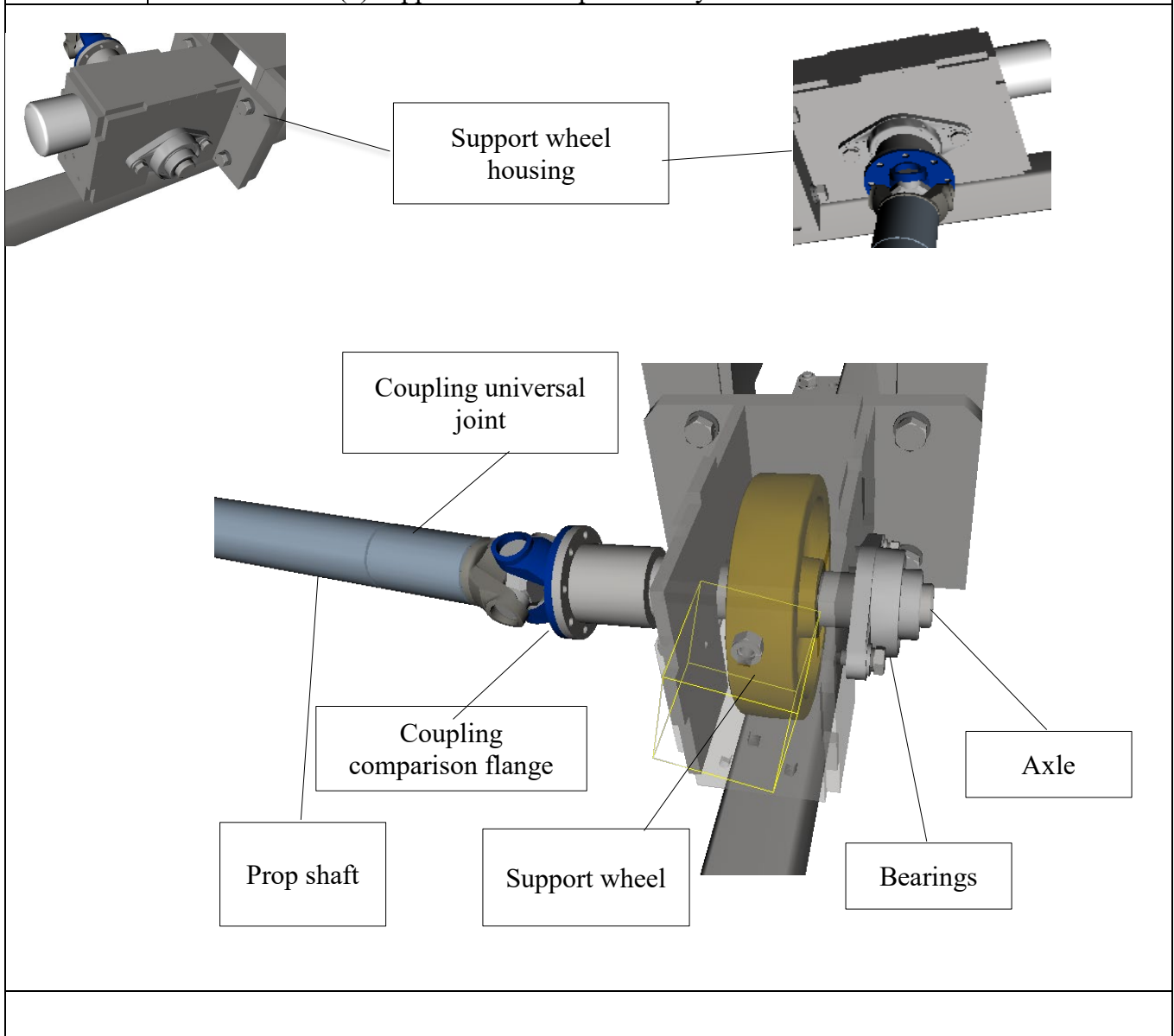
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Procedure – Support Wheel Replacement

The support wheels need to be inspected regularly. They are subject to damage from foreign objects and de-lamination over time. If the conveyor is rocking check the support wheels to ensure that there is no damage to the lamination on the wheel. If the support wheel needs to be replaced follow the following instructions

Step	Task
	There is a high risk of personal injury when changing a support wheel due to the rotation of the conveyor and turning frame. Ensure that turn table drive brake is engaged, there can be no movement of the turn table during the process of changing the support wheel. Chalk the other (3) support wheels to prevent any movement of the turn table



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	there is a high risk of personal injury when changing a support wheel due to the weight of the conveyor and turning frame. The weight of the conveyor and turning frame must be supported by a jack to release the weight from the support wheel during the process of changing the wheel
10	Apply chocks to the wheels that are not being changed.
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
20	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing any works
30	Check that the shuttle drive motor brake has been engaged
40	Once the shuttle has been blocked and is secure. Use a jack to take the weight of the conveyor and shuttle frame. Make sure that the jack is placed on a flat solid surface before attempting to raise the shuttle frame
	Only raise the turning frame with the jack enough to take the weight of the frame and remove the support wheel. If the turning frame is raised too much there is the potential of twisting the frame and changing the alignment around the centre guides.
50	When the shuttle frame is raised use wood blocks to be inserted between the shuttle frame underside and track. This is to support the shuttle frame when the support wheel housing is removed
60	On the drive end, the prop shaft will have to be split. (Following the Prop Shaft Replacement instructions to split the Prop Shaft Coupling)
70	Separate the support wheel housing from the shuttle frame by removing the (4) fastening bolts. Remove the support wheel housing to a clean flat work surface. For a quicker replacement time have a spare replacement support wheel housing available to be installed immediately
80	Remove the bolts holding the support wheel bearings. Remove the support wheel assembly to be re-built
90	Remove the outside bearing from the axle. Measure the gap between the remaining bearing and support wheel to ensure the new wheel is installed in the same position.
100	Insert the new support wheel on the axle and measure the distance between the remaining bearing and support wheel to ensure it is located in the correct position. Tighten the grub (set) screws on the support wheel securing it to the axle.
110	Re-install the bearing on the axle
120	Re-install support wheel to the support wheel housing and insert the mounting bolts through the bearing. Tighten the bolts to mount the support wheel to the support wheel housing.
130	Re-install the support wheel housing onto the shuttle frame. Insert the bolts and tighten.
140	When the new support wheel is secure lower the jack and remove.
150	Re-connect the prop shaft on the drive end.
160	Remove all the wheel chocks to allow the shuttle frame to move manually to check the free movement of the shuttle.

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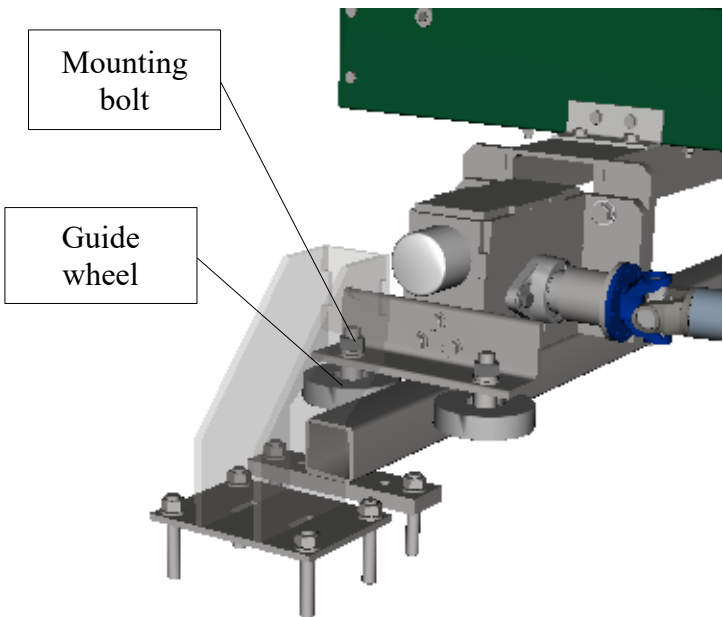
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170	Release the brake on the shuttle drive and manually move the shuttle. Check the alignment and level of the conveyor is correct in each home position. Check that the new support wheel is always in contact with the shuttle track . Make sure the new support wheel has not lifted the adjacent support wheels causing a twist in the shuttle frame.
180	Check and match mark all the bolts before leaving the area.

Note: If the shuttle is older it would be a good practice to change all (4) support wheels at the same time. This will ensure that all wheels have the same diameter on the running surface.



Procedure – Guide Wheel Replacement

The support wheels need to be inspected regularly. They are subject to damage from foreign objects and wear over time. These instructions detail the procedure for replacing the guide wheels

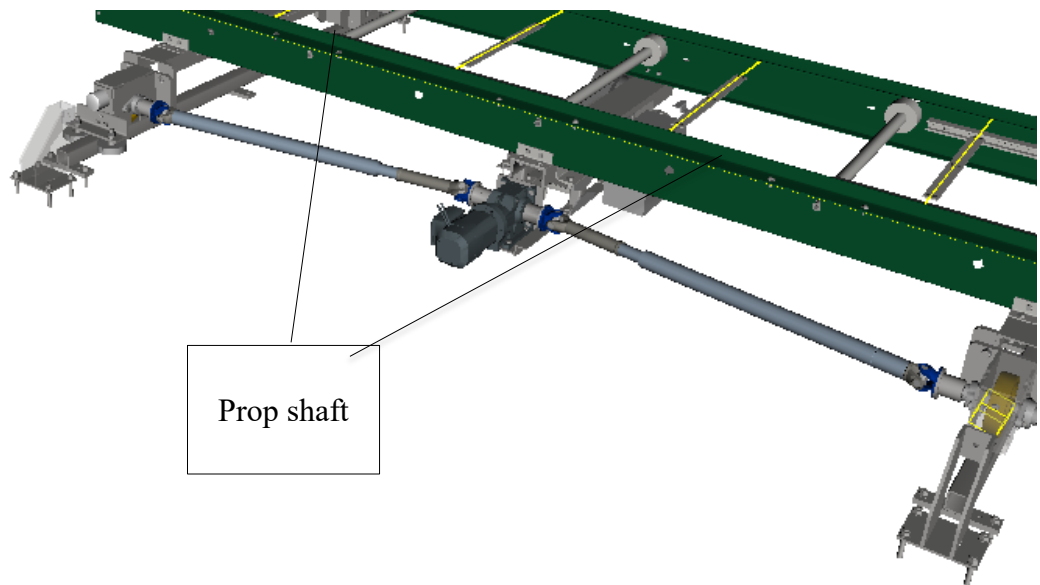
Step	task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
	
10	Apply chalks to the support wheels before attempting to replace the guide wheels
20	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing any works
30	Check that the shuttle drive motor brake has been engaged
40	Using the correct tools remove the bolts holding the guide wheel to the mounting bracket
50	Remove the guide wheel and insert a new guide wheel
60	Tighten the mounting bolts
70	Remove all the wheel chalks to allow the shuttle frame to move manually to check the free movement of the shuttle

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80	Release the brake on the shuttle drive and manually move the shuttle. Check the alignment and level of the conveyor is correct in each home position. Check that the new support wheel is in contact with the shuttle track at all times. Make sure the new support wheel has not lifted the adjacent support wheels causing a twist in the shuttle frame
90	Check and match mark all the bolts before leaving the area
Note: If the shuttle is older it would be a good practice to change all (4) support guide wheels at the same time. This will ensure that all wheels have the same diameter on the running surface.	

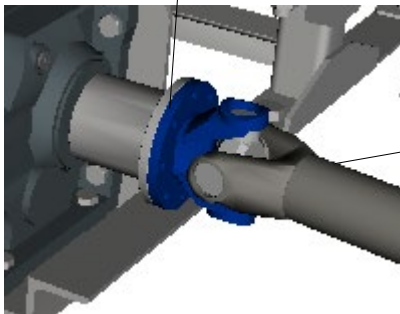
Procedure – Prop Shaft Replacement	
Before replacing the prop, shaft check the universal joints have been lubricated properly and coupling fasteners are tight. If the prop shaft has been maintained correctly and still does not function correctly proceed with the replacement of the prop shaft.	
Step	task
	Follow LOTO procedures before commencing with works. Ensure that END USER's facility safe work procedures are followed.
10	Apply chalks to the support wheels before attempting to replace the prop shaft(s)
20	Ensure that the electrical power has been isolated for the drive and the isolating switch has been locked off before commencing any works
30	Check that the shuttle drive motor brake has been engaged
40	Loosen the bolts on the prop shaft coupling. Remove the bolts in order to disconnect the prop shaft and split the coupling. Care must be taken to avoid letting the prop shaft fall when the last bolts is removed. Support the prop shaft before removing the last bolt. Ensure that proper lifting procedures are followed in order to avoid injury
50	Before removing the prop shaft make sure the shaft is supported. Remove the remaining bolts to remove the prop shaft
	Ensure that proper lifting procedures are followed due to the length and weight of the prop shaft.
60	Remove the old prop shaft and insert the new prop shaft.
70	Insert the bolts to connect the couplings and tighten. (Torque the bolts to the correct settings
80	When the new prop shaft is connected and tightened properly, in manual mode rotate the drive to ensure the prop shaft transfers the drive to the both conveyor drive sprockets correctly.
90	Ensure the conveyor is performing correctly and bolts are match marked before leaving the conveyor

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Prop shaft


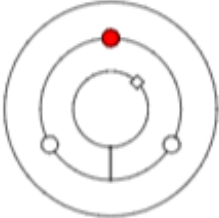
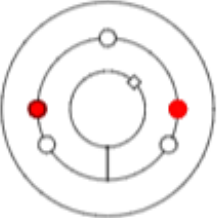
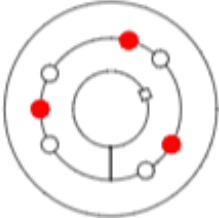
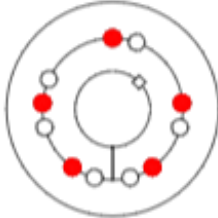
Coupling
comparison flange






Coupling universal
joint

Procedure - Taper lock Bushing

Taper lock Bushing are used to secure the sprockets and/or pulleys to shafts. This is a generic procedure that applies to all taper lock bushing with grub (set) screws.

Step	Task
	Ensure that the electrical power has been isolated for the lifting drive and the isolating switch has been locked off before commencing work.
10	If the taper lock bushing is used in the pulley mounted on the motor/reducer follow the removal procedure.
    <p>1008 TO 3030 3535 TO 6050 7060 TO 10085 120100</p>	
20	Remove all the screws holding the bushing in place.
30	Insert a screw(s) in bushing hole(s) marked 'Red' circle to loosen the bushing, alternating the tightening of the screws.

Procedure - Taper lock Bushing Replacement

Step	Task
10	Clean the shaft, bore of the bushing, outside of the bushing and hub bore of all oil, paint and dirt. File any burrs
20	Insert the busing into the hub. Match the hole patterns, not the threaded holes (each completed hole will be threaded on one side only)
Note: If two bushing are used on the same component and shaft, fully tighten one bushing before working on the other	
	Do not lubricate the bushing taper, bushing bore, hub taper or shaft. Doing so could result in breakage of the product
30	Lightly oil the grub (set) screws and thread them into those half-threaded holes indicated by the 'RED' circle
	Do not use worn Hex Key wrenches. Doing so may result in a loose assembly or may damage the screws
40	Position assembly on the shaft allowing for the axil movement which will occur during the tightening process
50	Alternately torque the grub (set) screws to the recommended torque setting
Note: When installing bashing in sintered steel product (such as a sheave, coupling, etc.), follow torque recommendations on the product if present.	
	Where bushing are used with lubricated products such as chains, gears, grid couplings, be sure to seal all pathways (where lubrication could leak) with RTV or similar material

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60	To increase the gripping force, hammer the face of the bushing using a drift or sleeve
70	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose

Note: Do not hit the bushing directly with a hammer or any blunt objects.

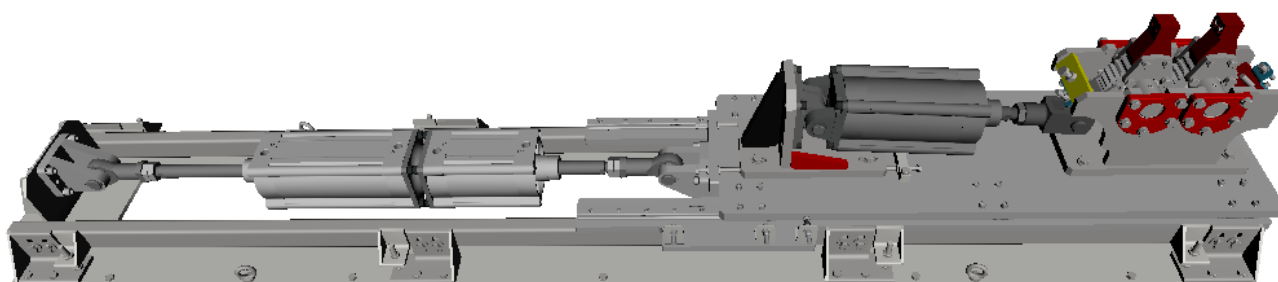
Brush Number	Torque (lb/in)	Torque(lb/ft)
1008,1108	55	4.6
1210,1215,1310	175	14.6
1610,1615	175	14.6
2012	280	23.3
2517,2525	430	35.8
3020,3030	800	66.7
4040	1700	141.7
4545	2450	204.2
5050	3100	258.3
6050,7060,8065	7820	651.7
10085,120100	13700	1141.7

80	Re-inspect screw tightness with a torque wrench after the initial run-in, and periodically thereafter. Repeat steps 5, 6 and 7 if the bushing(s) are loose
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Equipment	Summary
Stores Skid clamp	General maintenance tasks

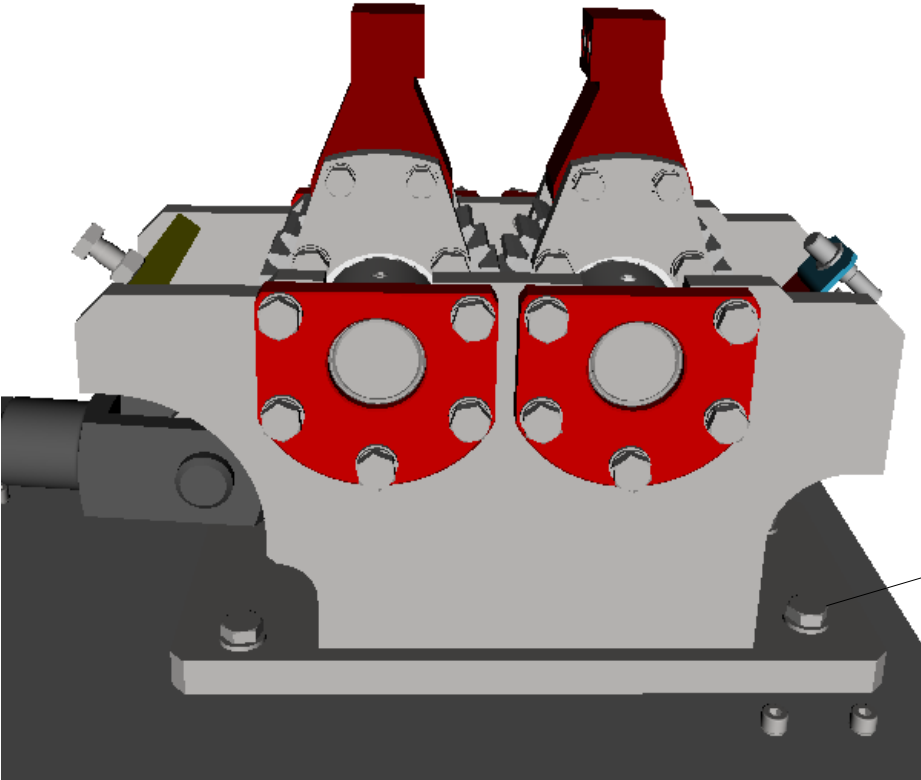



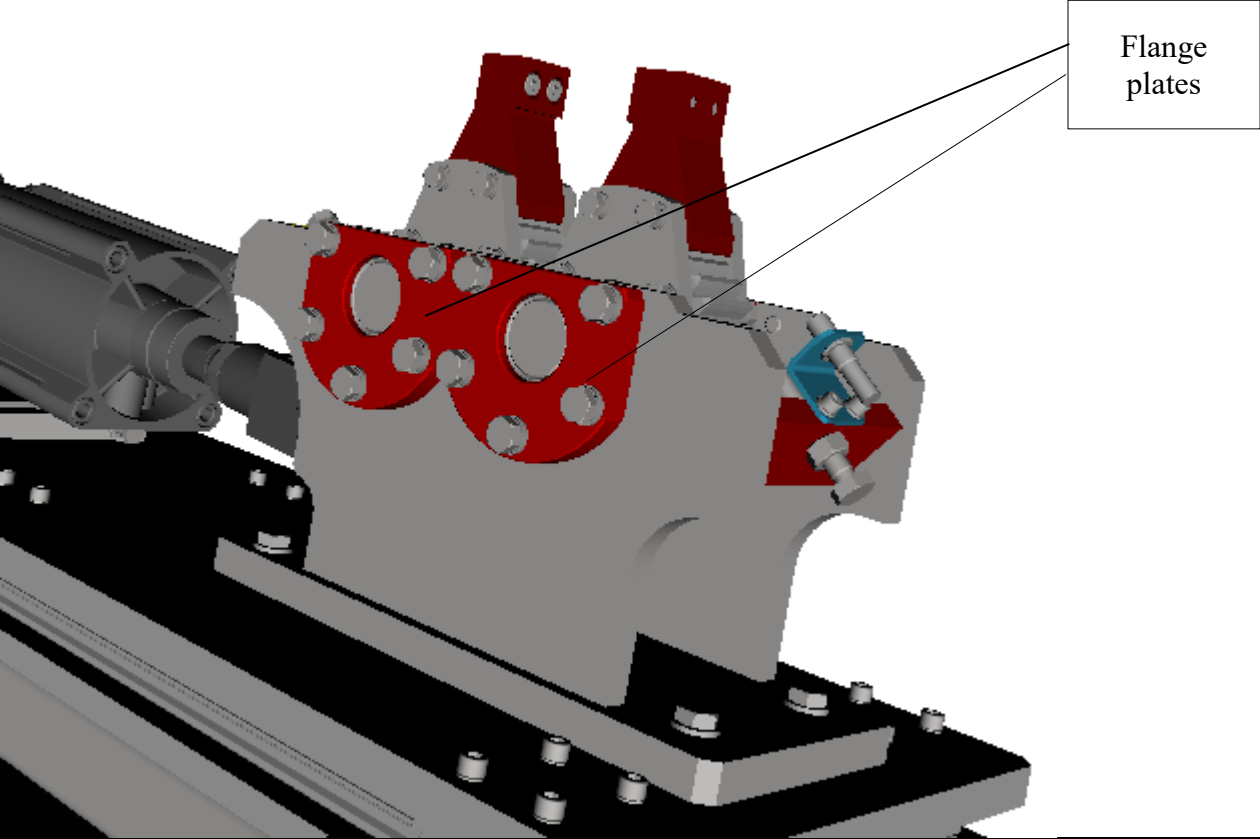
Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	
-	Safety Shoes	System in Manual
-	Bump Cap	

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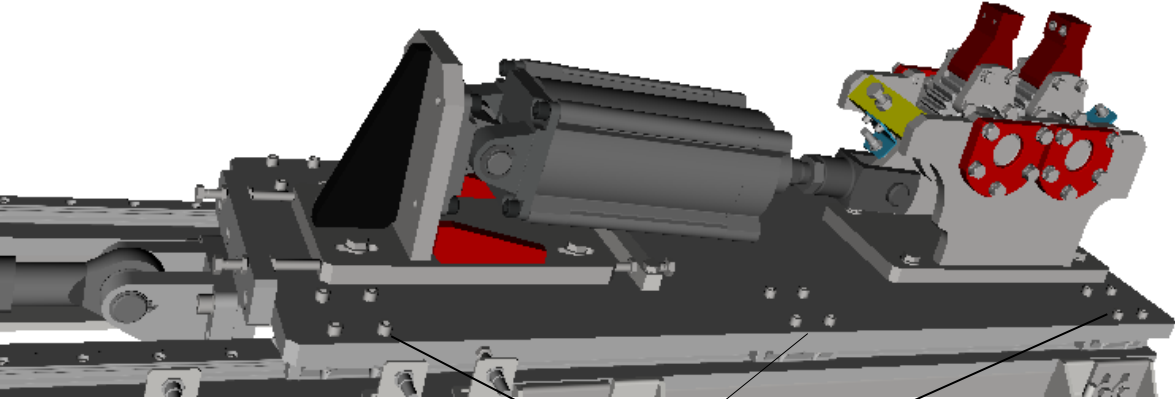
Items such as the clamp pads themselves and sensors can be replaced in-situ. Any other items such as the spur gears or internal bearings require the clamp assembly being removed and worked on elsewhere.

Procedure – Removing the clamp unit.

Step	Task
10	Loosen all four base plate bolts securing the clamp unit to the base.
	
20	Lift the clamp from the driving cylinder rod clevis
	Ensure that lifting procedures are followed to avoid injury.

Step	Task
10	The Spur Gear Assemblies can be lifted clear of the base fabrication if the bolts fixing the flange plates are removed.
	
20	When reassembling make sure the spur gear teeth are aligned correctly.
30	Ensure the clamp pads operate correctly.
40	On completion carry out a functionality test.

Procedure – Replacing THK units / Slides

Step	Task
10	Remove the entire clamp assembly and the entire cylinder assembly
20	Unbolt the plate underneath the clamp and cylinder assembly.
	
30	Remove the plate and slide the THK units off the rail and replace with correct part, also if necessary, the rail can be replaced as well.

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Summary
4 Post Stores Lifter	General maintenance tasks



Safety Conditions	PPE Required	System initial Condition
System isolated off following LOTO procedure	Safety Gloves	Remove dollies and bodies
-	Safety Shoes	System in Manual
-	Bump Cap	

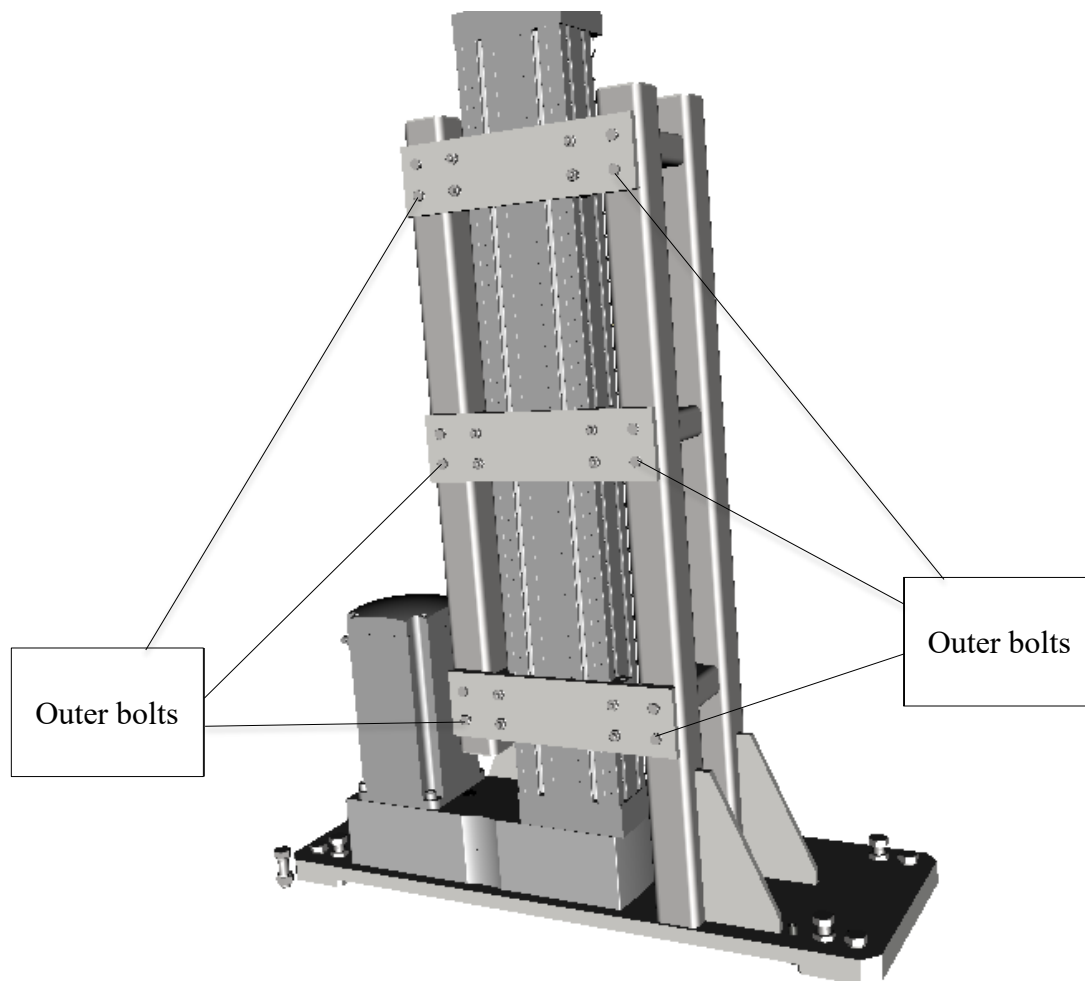
demo	Revision 1
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If there is a mechanical problem with the servo motor that drives the guided spindle axes, the motor can be removed individually, and the guide and parallel kit can remain in position.

Procedure – Guide and Parallel Kit replacement

Step	Task
10	Ensure that the fabrication and pad used to support the car body are removed
20	If there is a problem with the guide or the parallel kit, the entire unit will need to be lifted out. Using slings, take the weight of the entire unit. Remove the outer bolts.



30	Take the removed unit away for repair or disposal. It is Recommended that a complete unit including spindle axes, parallel kit, motor and mounting plates is kept as a spare to enable quick replacement.
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3.6.5 Chain Analyser Meter

This is a useful guide for maintenance personnel with the intention of obtaining maximum durability of the installation.

The safety standards, operation and maintenance instructions for the equipment supplied and assembled at BENTLEY facilities are described here. The information contained expects to satisfy any training required by the client. The instructions described are developed specifically to actively assist maintenance personnel and do not attempt to replace or replace the customer's own criteria.

This manual is mandatory for personnel performing maintenance operations or repairs of the supplied material. The manual must be delivered to the work supervisor to plan the work, schedule it, evaluate it and report on it.

The application of the procedures contained in this manual will prevent costly breakdowns, provide an economical and uniform maintenance program for this equipment and ensure proper operation of the system.

The reliability of mechanical equipment depends for the most part on the proper procedures for maintenance and maintenance. Each piece of equipment must be thoroughly inspected at regular intervals and corrective measures taken to prevent breakdowns and loss of production time.

It is the responsibility of the supervisor that all persons involved in the operation of the equipment have full knowledge of the machinery and are familiar with the location and use of all unemployment devices.

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List of recommended spare parts.

For more information see Chapter 6 – *List of Spare Parts*.

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Description of components

Description of the mechanical and electrical components of the installation, as well as the installation and maintenance manuals of commercial equipment.

For more information see Chapter 7 – *Description of Components*.

Maintenance boards

For more information, see document 9 – *Maintenance Tables*.

CE certificates

CE Certificates refer to document 10 – *CE Certificates (last page)*.

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General safety standards.

Introduction



Before starting any intervention in the installation or any of its machines, it is mandatory to comply with the knowledge of the general safety standards and those specified for the installation and each machine.

Those who do not strictly apply these rules may suffer irreparable damage or cause them to persons and/or things.

Chapters should also be read before handling the machine:

- "General Rules for Installation and Assembly"
- "General Maintenance and Repair Rules".



We disclaim any liability for damages caused to individuals and/or things for non-compliance with safety standards or arising from such compliance. Safety standards are understood as those indicated in this manual and the regulations in force in the country of use.

Warnings



The indications in this chapter of the instruction manual shall be considered as complementary to the safety standards referred to in the individual manuals for each machine *if appropriate*.

No modification is allowed on the equipment without the written approval of the supplier. Arbitrary changes affecting the security elements are inadmissible, in any case.



All the measures and indications described in this instruction manual regarding service safety and points relating to safety in general and accident prevention, which must be carried out or observed before, during and after commissioning, have to be strictly respected. Non-compliance can lead to accident risks.

The controls and workers must be perfectly trained in the theory and practice of safe and suitable methods for their machine.

The user will ensure that the equipment is always used in perfect condition and in compliance with all applicable safety requirements and regulations.

Anyone who detects an imminent risk must immediately operate the emergency stop button corresponding to the equipment or its area. After making an emergency stop, the operator may relaunch the equipment only when it has ensured that the reason for activating this function has been abolished and that the continuation of the service does not represent any risk to exposed people.

The function of the security elements must not be overridden, or modified or used for a purpose other than that envisaged.

Before connecting/starting equipment, the operator must ensure that the service does not pose risks to people who may be in the vicinity.



The intervals specified in the operating instructions for the preventive maintenance schedule must be met (*see the manual for each machine*).

Staff training.

We have trained BENTLEY maintenance personnel, focused on several points:

- Team configuration
- Interpretation of data
- Detection of anomalies and incidents

During testing and training, a customization of the Standard programming has been carried out on maintenance request.

Description of the Team Introduction

The wear meter is basically an additional safety in the demanding processes in which chain conveyors work.

This system integrates a digital and software development that allows to measure the wear and elongation of the chain, generate alerts on the conveyor 24 hours a day 365 days a year.

The Software is designed for the management of various meters and special customizations according to the needs of the customer.

The software communicates with the chain monitors and allows the user to view the status of each monitor or monitors that are installed. The program saves the information received from each monitor and presents the chain wear information as well as performs a summary of information for the user.

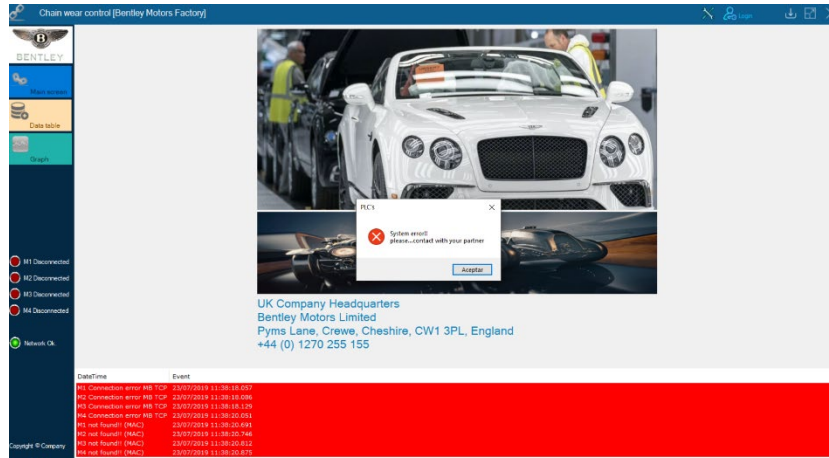
Measurements are saved at different intervals depending on the user's choice. The software allows to compare different measurements and prepare different reports.

Operating instructions

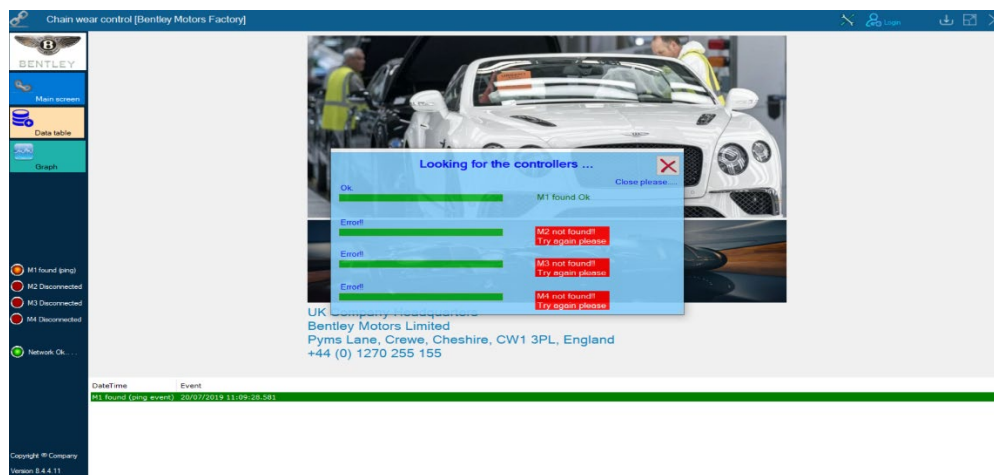
1. License check screen:

The software supplied is licensed for the 4 systems.

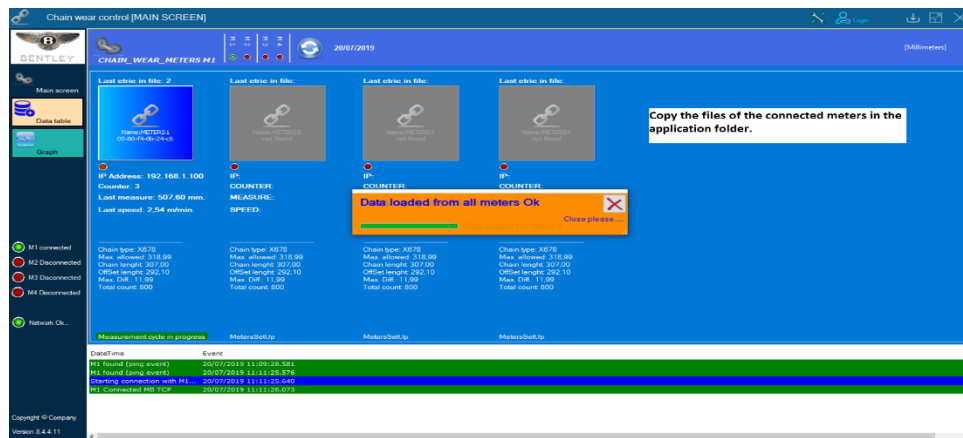
In this picture you can see that there is no license installed.



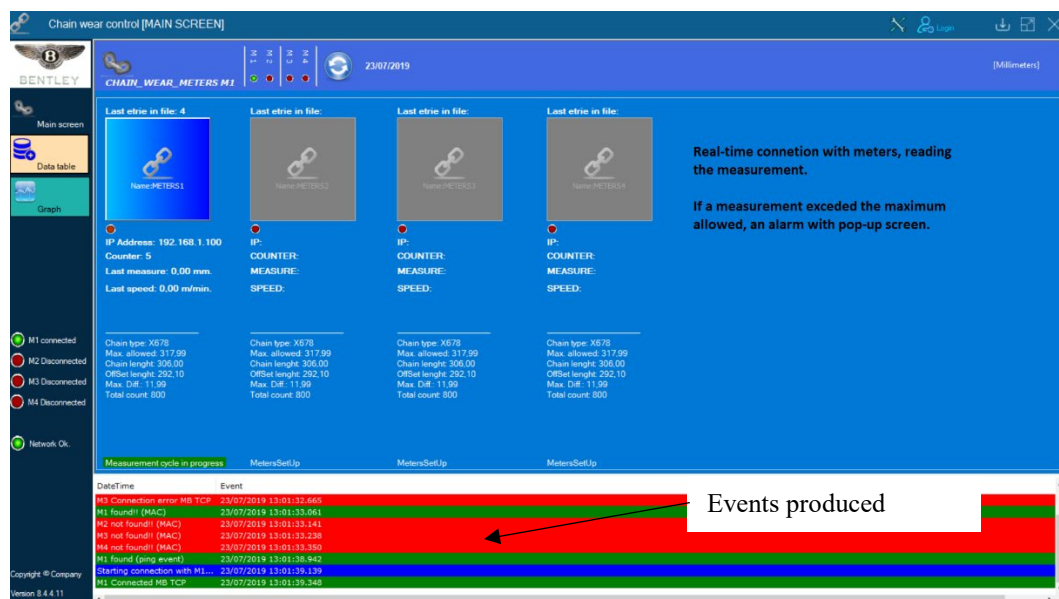
2. Connection screen with PLC (FTP port 21 data log and Modbus TCP port 502)



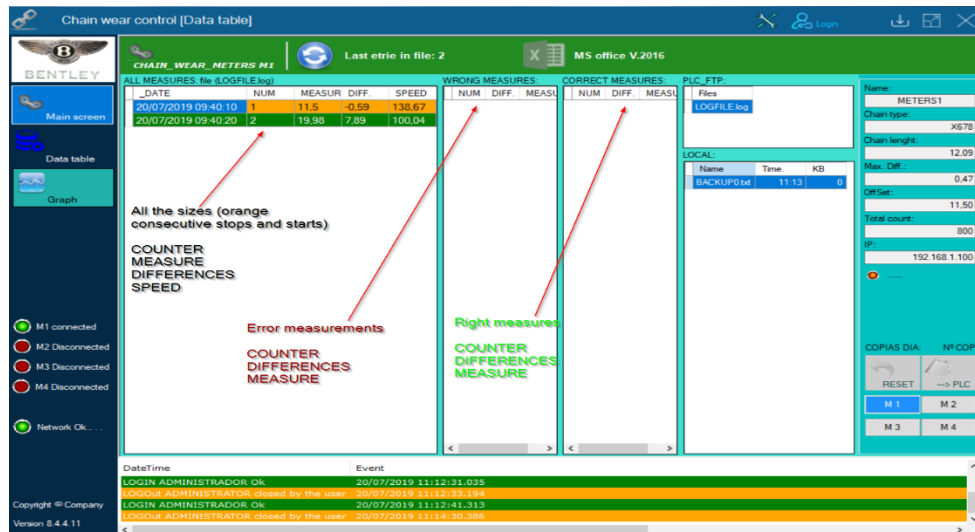
3. Data load Screen



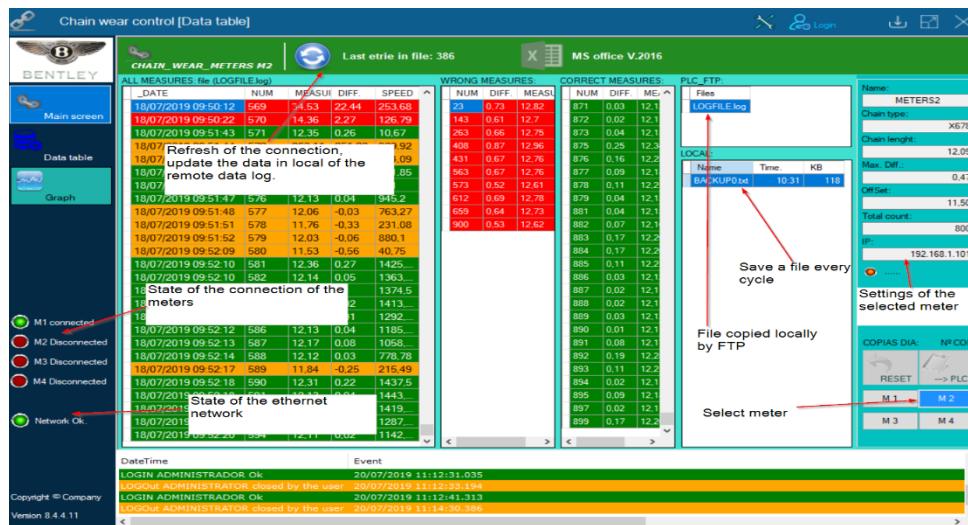
4. Main Screen



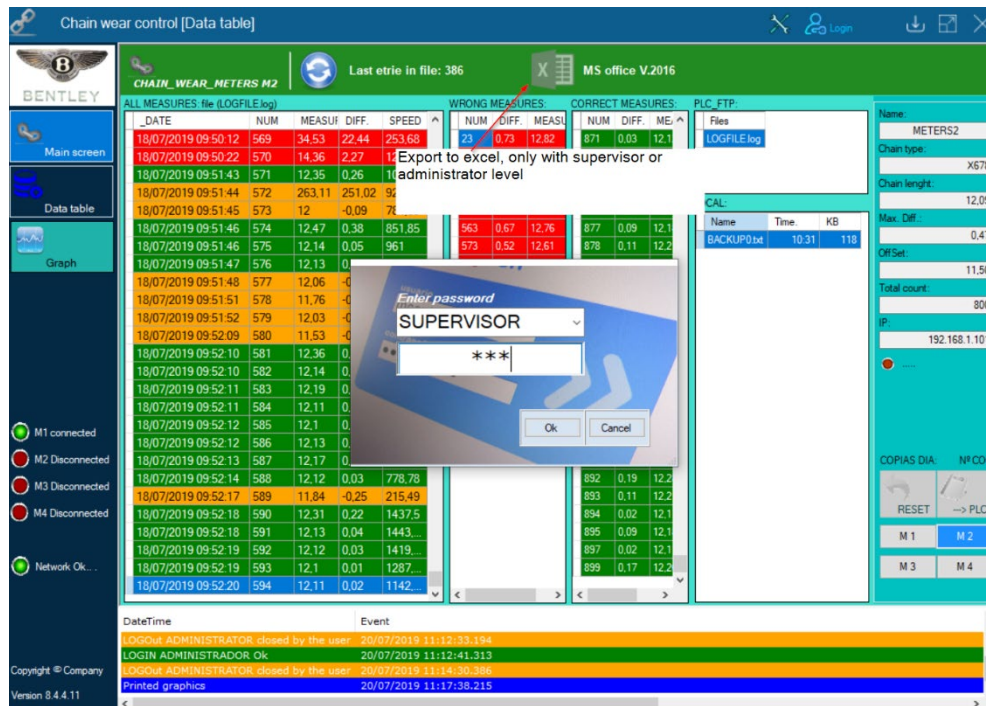
5. Data table Screen / 1



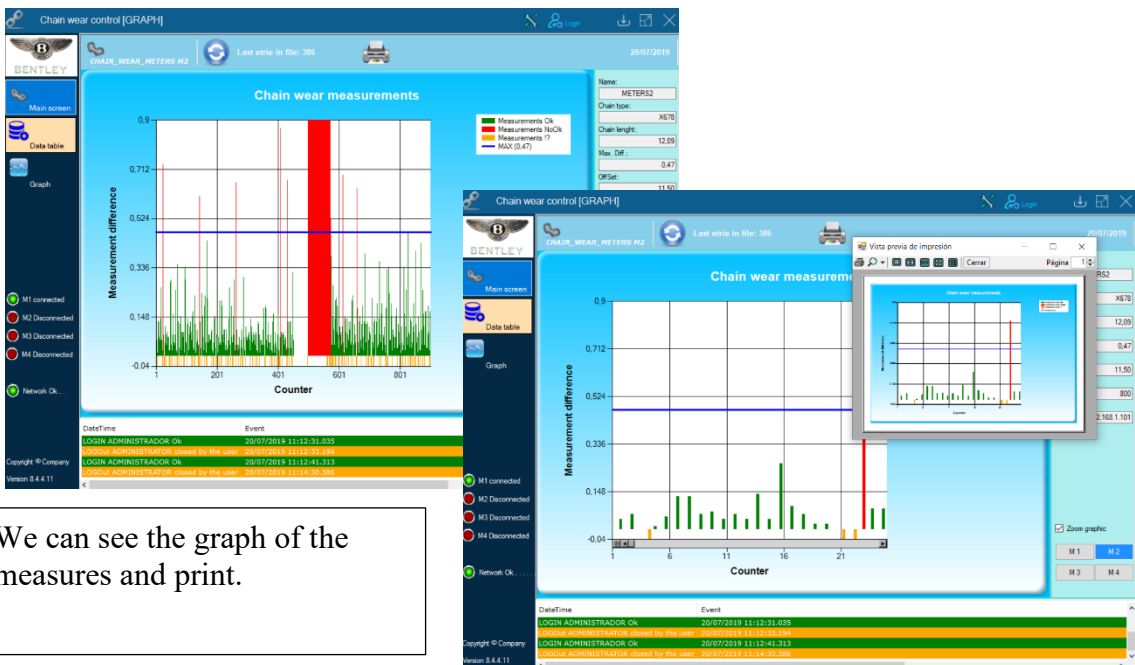
6. Data table Screen / 2



7. Data table Screen / 3



8. Graph screen / 1



We can see the graph of the measures and print.

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10. Users screen

The screenshot shows the 'Chain wear control [Data table]' interface. A login dialog box is centered, prompting for a password and offering three user levels: OPERATOR, ADMINISTRATOR, and SUPERVISOR. The background displays a data table with columns for DATE, NUM, MEASUR, DIFF, and SPEED. A text box on the right states: 'There is the possibility of 3 levels of access to the program. Limiting certain options.'

11. Settings screen

The screenshot shows the 'Chain wear control [Data table]' interface with the 'SETTINGS' dialog box open. The dialog box contains configuration fields for four meters (METERS1 to METERS4), including Name, Chain type, Chain length, Max. Diff., Off Set, Total count, and IP. It also includes a 'USERS' section with fields for OPERATOR, SUPERVISOR, and ADMINISTRATOR, and a 'Connected' status indicator. The background displays the same data table as in the previous screenshot.

demo


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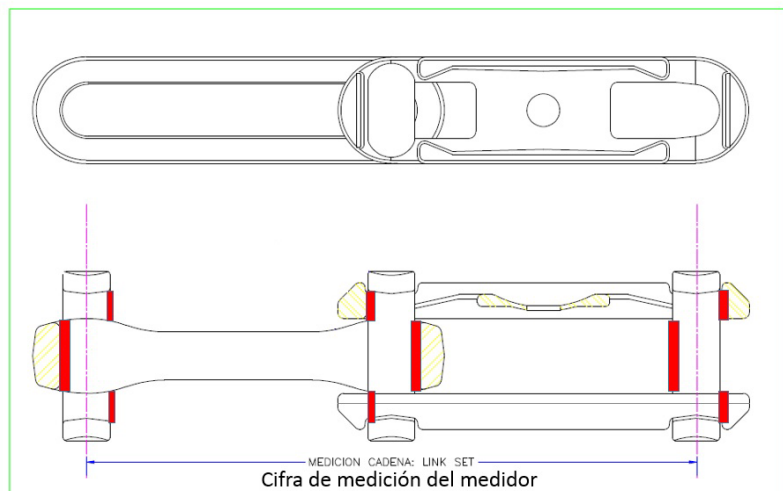
O & M

How measurements are made:

Previously, it is necessary to configure the computer that is done through the screen.

- Measurement accuracy can be 0.02" as long as the links are clean.
- The software allows you to configure the measurements in inches or millimeters
- Analysis data can be analyzed in tranches or the entire line.
- Digital output signals to operate a sound/light beacon or link marking system.
- The software has different user and reporting configurations, and special customizations as an option.
- Windows platform based on Windows 7/10 64-bit. The required PC (not included) would be an I5 8 GB LAN card.
- The wear machine does not identify BREAKS in meshes, calculates wear on the LINK SET (detail of wear points is attached). It is not an element that identifies BREAKS but PREDICTs possible breaks in the future.

 Puntos de desgaste
de la cadena

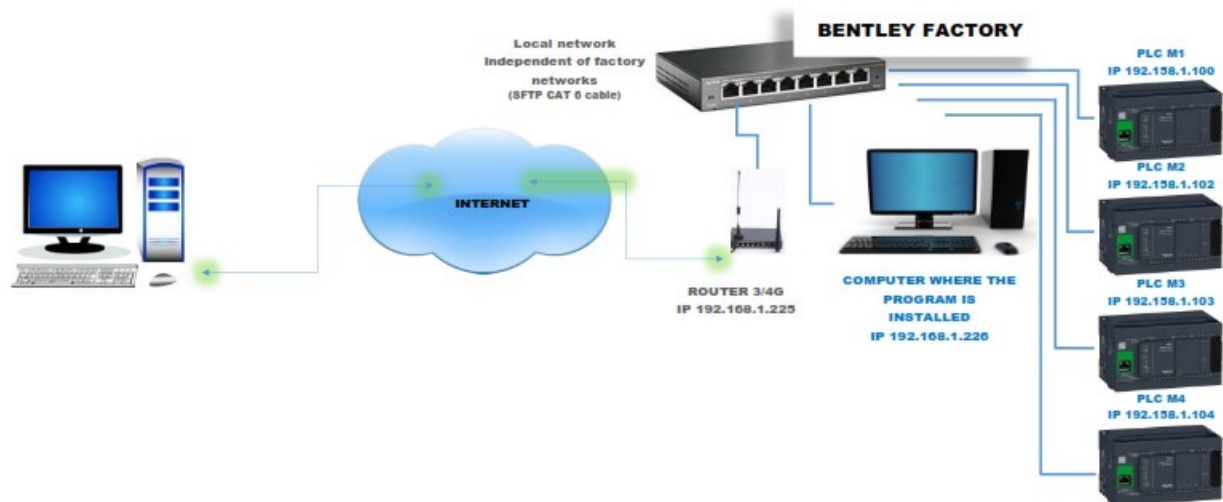


That wear when it exceeds 0.45" approx. 3.81-4 mm the chain may suffer fatigue breaks in the chain.

- The break age in a mesh does not affect the increased wear, as it always breaks on one side and the mesh does not open until it breaks.
- In wear software it is predictive and helps to control the condition of the chains and their evolution in wear, placing limits in which it indicates the life of the chain.

Installation plans.

Router 3G



The router supplied includes a 3G card with 15G of data (limited for 4 months (limited for 4 months, then you have to put another card)). You are already certified for remote connection with the Schneider MC241 PLCs.

The configuration we propose is a local network between the 4 meters, the 3G router and the PC where the program will be installed.

In this way, the measurement system network and the other networks of the factory are completely independent.

RJ45 Ethernet network socket C6 S/FTP Cable Shielded. One IP for each meter in the installation.

For connection with the computer "online" you can use "AnyDesk", is free software.

For the online connection to the PC we can use an application, "anyDesk", attached installable and video how to use.

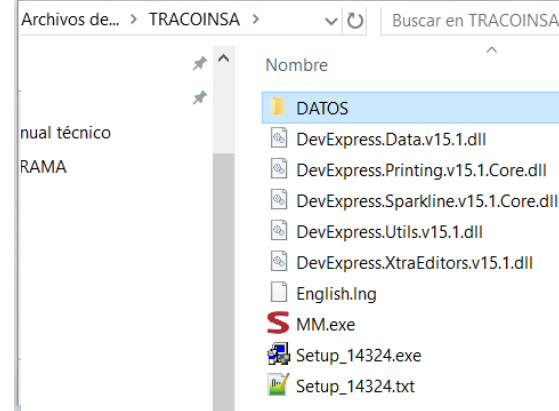
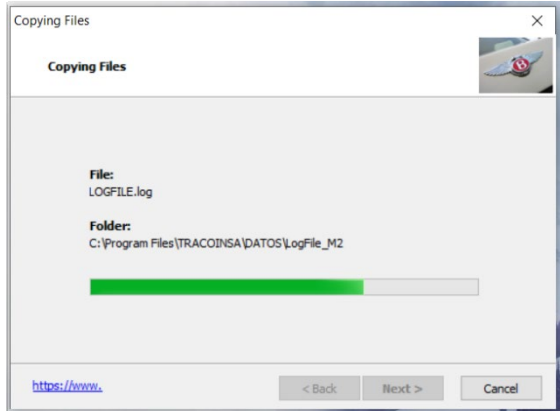
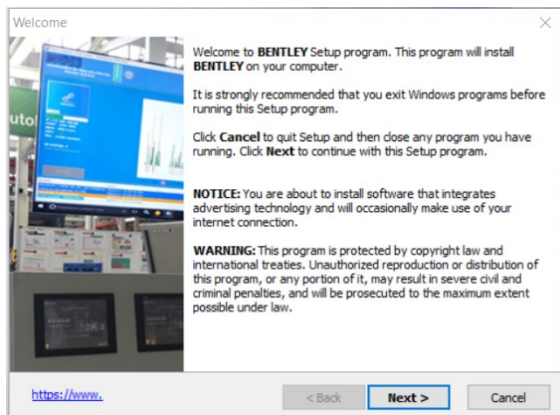
Installation of the meter control program

We supply an installer to facilitate the introduction of data correctly in the system.



The software is developed in .NET and it is necessary to have Framework 4.7.2 installed.

La Windows platform based on Windows 7/10 64-bit. The required PC (not included) would be an I5 8 GB LAN gigabyte.



The program creates a data folder in program files with the necessary configuration to start.

Structure Mechanical Support

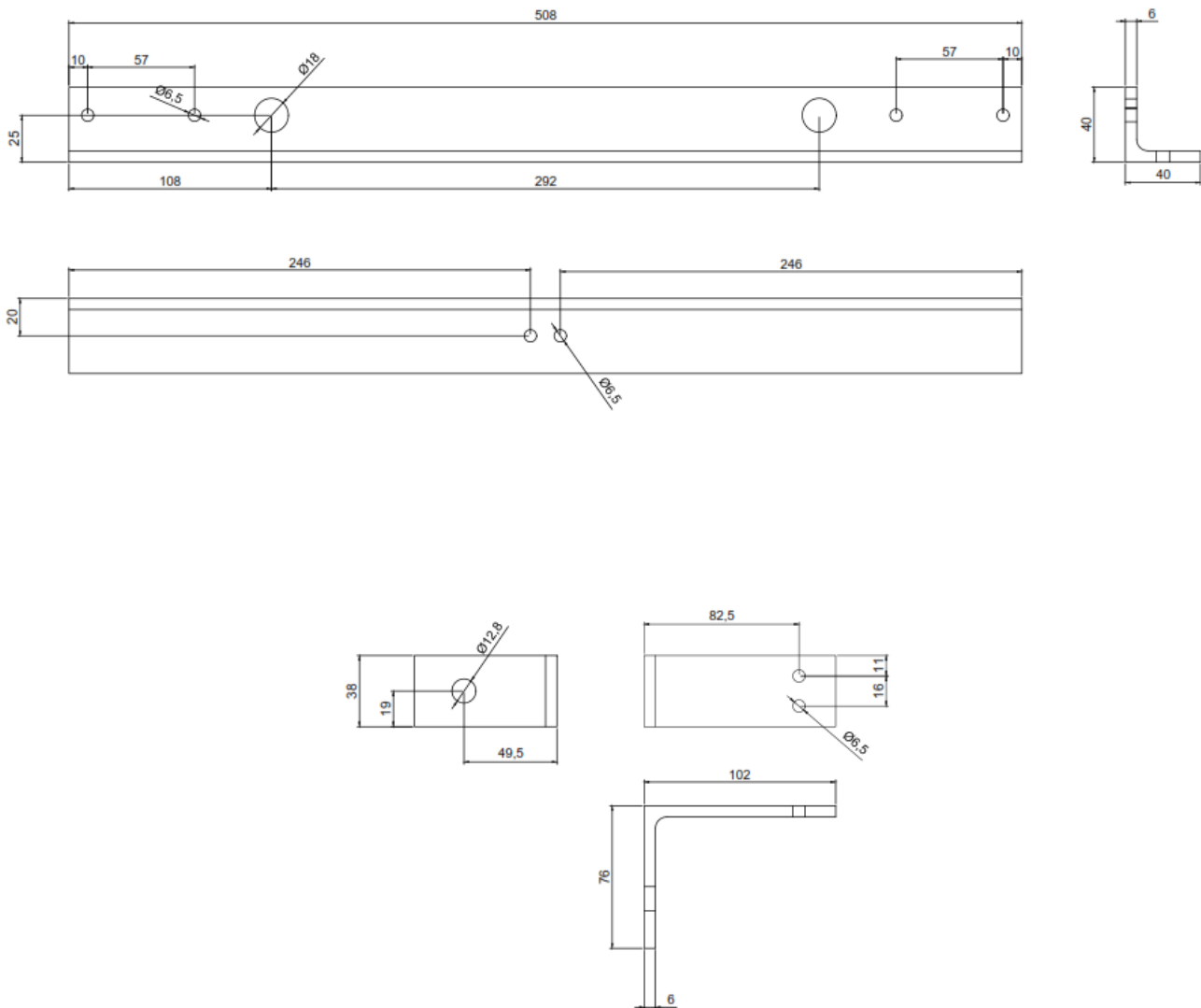
Steps to follow in the placement of the structure:

-
- Magnetic sensor Counter=0
- Offset
It is very important to measure this distance
- Movement Direction
- It's very important
- LASER 2
- LASER 1
- ice V.2016
- MEASURES: PLC FTP
- Files
- LOGFILE.log
- LOCAL
- | Name | Time | KB |
|-----------|-------|----|
| BACKUP000 | 11:13 | 0 |
- Offset
- 11.50
- 132 168 1.100
- RESET → PLC
- M 1 M 2
- M 3 M 4

NOTE: If bending is detected in the structure, place the sensor side attached to the conveyor beam.

It is very important that the offset measurement (between laser points) is always the same. Sensors selected as NO (normaly OPEN).

Support sketch:



Electrical part:

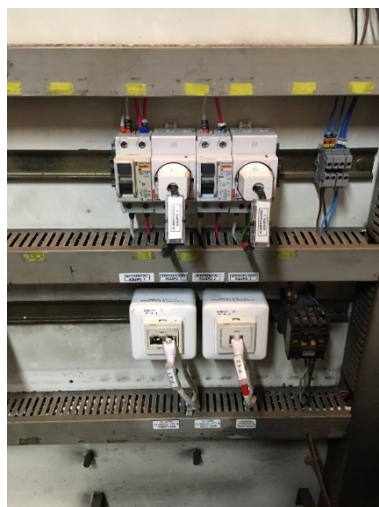
220VAC line. Monophasic

- 1 Differential 2 x25A
- 1 circuit breaker electrical protection 1 +Nx10A (C60N)
- 1 Suchkoplug base

It is recommended that the line is protected by a UPS (Not essential if the line does not suffer sudden drops or surges).



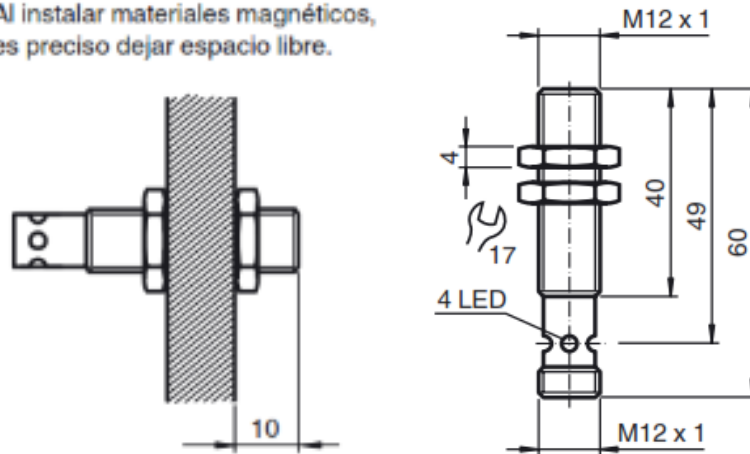
RJ45 Ethernet network socket C6 S/FTP Cable Shielded. One IP for each meter in the installation.



Magnetic Sensor:

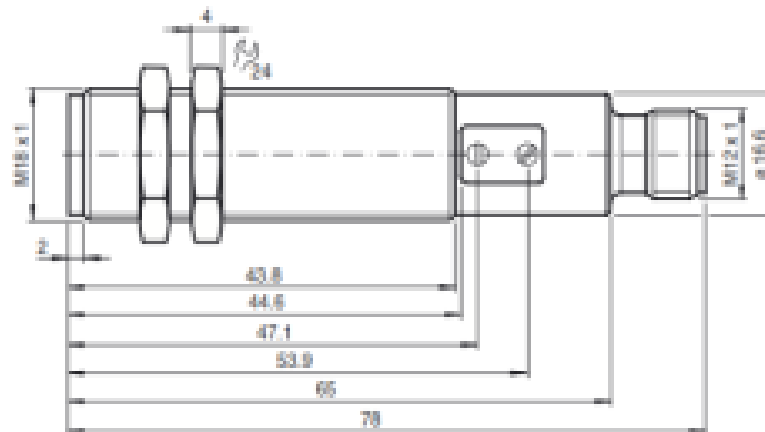
- Connection via M12 connector

Al instalar materiales magnéticos,
es preciso dejar espacio libre.



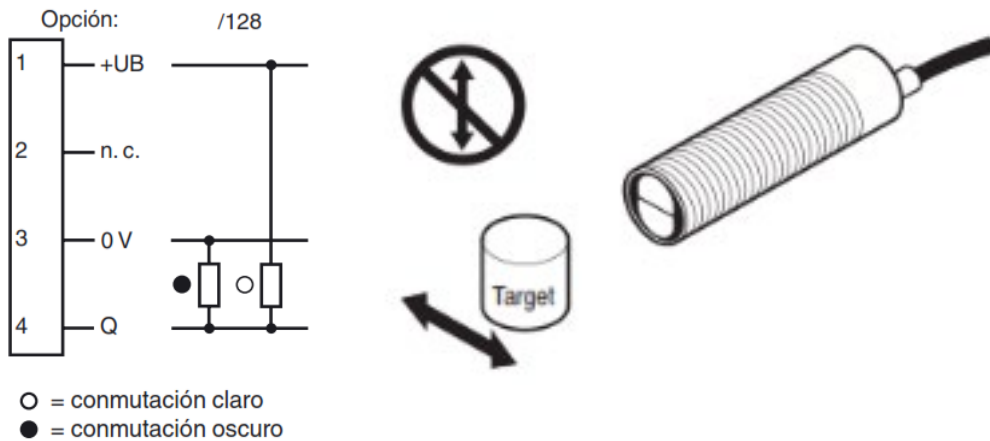
Laser sensor

- Connection via M12 connector



Connections:

Conexión eléctrica



The connection cable for the detectors is 4x1 with M12 connector.

Free potential

Maintenance

Measurement equipment needs regular maintenance because of the dirt and vibrations that exist in the facility. If the chains are not clean or have grease sticks the measurement is not correct and will give measurement error. It'sveryimportantacleaningof thechains.

Revisions calendar

Component	Suggestion	PERIOCITY
Sensors	TIGHTENING SCREWS	Quarterly
Support	TIGHTENING SCREWS	Quarterly
Sensors	CHECK MEASUREMENT OFFSET (DISTANCE BETWEEN SENSORS)	Quarterly

Problem solving

"THE SYSTEM DOES NOT MEASURE"

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If the transport is in operation that does not measure, checking the photocells may be poorly adjusted.

"Communication FAILURE" (TimeOut).

It is likely due to poor communication between the meters and the PC.

"ORANGE MEASURES"

The system is designed to perform continuous measurements, if the transport for and start the measurement is not correct and we reflect it in orange in the table and in the graphs.

List of spare parts

CANT.	Description	Manufacturer	REFERENCIA
2	F.C.LASER	P&F	VL18-54-M- LAS/40a/118/128
1	MAGNETIC FIELD SENSOR	P&F	MB60-12GM50-E2-V1
1	Plc	Schneider	TM241CE

Warranty and Conditions

A warranty period for equipment comprising this document is established for 24 months from the date of completion and acceptance by the customer.

The warranty is limited to the ex-works replacement of parts that it recognizes as defective by default of the material or manufacture and does not include workmanship or transfer for replacement.

Parts as electronic components are exempt from the general warranty and the warranty will be that of the manufacturer.

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We will not be liable for any damages and malfunctions in the service arising from non-observation and/or non-compliance with the instructions contained in this manual.

Warranty claims must be communicated immediately, indicating the corresponding serial number, equipment position and part reference.

The warranty shall be void and void in the following cases:

Incorrect use, handling or maintenance by the Customer of a machine, equipment, component or peripheral does not conform or confine the instructions.

Modifications without written authorization.

Repair, modification or extension of a equipment by the customer or any other person unauthorized.

Wiring and incorrect connections made by third parties.

Components burned by surges or electrical surges

Warranty exclusions

Defects and deterioration caused by external events, accidents, mainly wear and tear due to use and electrical accidents are excluded from any warranty.

Products that are the subject of a specific support contract other than the one in the installation.

Travel expenses are not included in the guarantee.

After-sales service

An after-sales service is offered to its customers through which it tries to solve all its queries and claims that can be made about the machine in question.

To place the order of spare parts, please inform us:

Serial number.

Position number in the Lay-Out.

Part reference number.

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QUALITY CERTIFICATE

Asesoría y Realización de Automatismos S.A. certify that said team has passed in accordance with the **UNE-EN 60.439.1** Standard, the following tests:

- Warm-upcheck
- ✓ Dielectric stiffness check 2 by rated intensity plus 1,000 (60sec)
- ✓ Insulation resistance check (10sec).
- ✓ Buyingshort-circuit resistance
- ✓ I check the fixing and connection of the cables.
- ✓ Checking mechanical operation
- ✓ Checking the cable sections
- ✓ Voltage check in contact bomas, automatic.
- ✓ Checking the protection circuit
- ✓ Icheckthe distances of insulation and leakage lines
- ✓ Checking the degree of IP protection,
- ✓ Checking land in squareor odoor, continuity-12>10 A (10sec.)
- ✓ Appearance exterior and inside of the frame
- ✓ Tests performed with HT 4050 FULL TEST no series 03062203

DECLARATION OF CONFORMITY

Identification of the electrical panel
Customer: BENTLEY
Production date: 12/07/2019.

We declare that this table is accompanied by the schemes and plans of description or detail, according to the memory of the project of the table.

The 3 individual tests listed below have been carried out and passed in accordance with Standard **UNE-EN 60.439.1**:

- 1.- Wiring and electrical operation
- 2.- Final dielectric test
- 3.- Protection circuit check and operation

Signature and stamp company:



demo

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4.0 OPERATING INSTRUCTIONS

4.1 GENERAL

4.1.1 Purpose of this documentation

This manual is an integral component of the system. Make sure that the manual remains near the equipment and thus is always available to the operating and maintenance personnel.

The present manual informs the user of the following:

- Functioning,
- Handling,
- Safety instructions,
- Maintenance.

We reserve the right to make changes to the contents. Acme Corp System (UK) are not liable for any errors in this documentation. Any liability for indirect damages that occur within the context of delivery or use of this documentation is excluded as far as this is legally permissible.

This operating manual remains the property of Acme Corp System (UK) and is only entrusted to buyers of our machinery. It contains drawings and regulations of a technical nature and must not be copied, disclosed, circulated, or inadmissibly used or imparted to others for competitive purposes. (Copyright Law of 09.09.65 and Unfair Competition Law of 03.07.04).

This operating manual must be kept in the vicinity of the equipment and must be available for consultation at all times.

If you have any questions, please contact us directly and we will be happy to provide you with any information and advice you may need:

Acme Corp

4.1.2 Intended use

The ## Buffer System is designed to be used for the storage of vehicles in the paint shop facility. Any other use of the system above and beyond this is deemed to be improper use.

The system has been built in compliance with approved safety-related regulations. However, its use can nevertheless constitute a hazard to the user or third parties or can result in damage to the equipment and other material assets.

The system must only be used for its intended purpose and when it is in perfect technical condition. Proper use also includes compliance with the instructions given in the operating manual and adherence to the inspection and maintenance instructions and schedules.

Any faults which could impair the safety of the system must be rectified immediately.

No liability whatsoever will be accepted for any damage caused by improper use of the equipment.

demo

Revision 1

4.2 FUNDAMENTAL SAFETY INSTRUCTIONS

4.2.1 Knowledge and keeping of the operating instructions

Knowledge of the general safety instructions that are given in the manual is a basic requirement for handling and trouble-free operation of this system.

All operating personnel must comply with the instructions given in the operating manual, paying attention to the safety instructions within.

Furthermore, all local accident prevention rules and regulations must also be heeded.



4.2.2 Qualification of operating staff

Only instructed personnel can operate the equipment, define clearly the responsibility of the personnel concerning operation.

In the course of training, special emphasis should be placed on instruction about the hazards and required safety measures.

This instruction must be repeated regularly, at least once a year.

The responsibilities of the personnel for operation, setup and maintenance of the equipment must be clearly defined.

Make sure only authorised personnel will operate the equipment!

Appoint an equipment supervisor and define his responsibilities and allow him to refuse instructions from third parties if these are contrary to safe operation!



Warning!

“ONLY AUTHORISED COMPETENT PERSONNEL TO PROGRAMME OR MAINTAIN THIS EQUIPMENT”

Instruction to warn that only trained maintenance engineers should be allowed access to the equipment and the manual operations for error Recovery or Maintenance.



Warning!

“COMPETENT OPERATORS MUST OBSERVE ALL SAFETY PROCEDURES”.

Warning that only trained and competent personnel should operate the cell and that all safety procedures should be observed.



Attention!

Only allow personnel undergoing training of any kind to work on the system under the constant supervision of an experienced person!

Work on the electrical equipment of the plant must only be done by a qualified electrician or by duly instructed persons under the supervision of a qualified electrician, in accordance with electrical engineering rules and regulations.

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Personnel	Instructed Personnel	Personnel With Technical Education	Personnel With Electro technical Education
Activities			
Transport	X		
Start-Up			X
Setup		X	
Operation	X		
Troubleshooting and repairs on electrical and electronic components			X
Troubleshooting and repairs on mechanical components	X	X	
Maintenance on electrical and electronic components			X
Maintenance on mechanical components	X	X	
Repair		X	X

4.2.3 Instructions to the operating staff

Everyone who is employed on the system

To read this operating manual and especially the chapter on safety, before starting work. This applies to any personnel who only occasionally work on the system, e.g. for setup or maintenance purposes,

To comply with the general work safety and accident prevention regulations,

Not to wear long hair loose, loose clothing or jewellery, including rings (risk of injury, e.g. by getting caught up in equipment components), to wear suitable headgear, if necessary,

To heed all safety and hazard warnings posted at the system plant, and to refrain from working in any way that could be considered unsafe,

To wear personal protective clothing (e.g. safety boots), if required by the regulations

The User undertakes to allow only reliable personnel to work on the system, who:

Are acquainted with the basic work safety and accident prevention regulations and have been instructed in the operation of the system,

Have read and understood the safety chapter and the warning notices given in this operating manual,

Are authorized to operate the system.

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The User further undertakes

- To check, at least occasionally, that his personnel are working in a safety-conscious manner in compliance with the operating manual,
- To ensure that the operating manual is always kept in the vicinity of the system,
- To give instruction about any other general legal and other binding accident prevention and environmental safety regulations, supplementary to those in the operating manual,
- To supplement the operating manual with any company-internal instructions (e.g. supervision and reporting duties to take account of factory specifics, such as work organization, work cycles, personnel employed etc.),
- To provide any necessary protective clothing and equipment (e.g. safety boots).

4.2.4 Hazards of operation

- Electrical energy



Attention!

Work on the electrical equipment of the system may only be carried out by qualified electricians or by an instructed person being managed and supervised by a qualified electrician according to EU and PUWER regulations. Proceed with extreme caution when dealing with electrical power.



Attention!

Before any work is carried out on the electrical equipment of the station, switch off the main switch and take suitable measures (e.g. lock it) to ensure it cannot be switched on. If it cannot be locked for any reason, display a warning notice at the switch that reads: "Do not switch on! Work in progress in the danger zone!". The employee who is responsible for carrying out the job(s) must keep the key on his person.

Inspect the system's electrical equipment at regular intervals. Tighten any loose connections and replace defective cables immediately.

The control cabinet must always be kept locked. Only duly authorized personnel who are entrusted with a key may have access to the control cabinet.

Only use genuine fuses of the prescribed amperage.

If any problems arise in the electrical power supply, switch off the system immediately.



There is an immediate risk of fatal injury when working on live parts!

*If you must work on live parts, make sure that a second person is present who can press the **EMERGENCY STOP** button or turn off the power at the main switch if an emergency should arise.*

Cordon off the work area with a red-and-white safety chain and display a warning notice.

Only use power-insulated tools!

- **Pneumatic energy**



Attention!

Only duly trained personnel may carry out work on pneumatic components of the system. The whole system must be depressurized, and measures must be taken to prevent the system from being switched back on again before any such work is done.



Warning!

Caution! On controlled entry to the cell, mechanisms may still be in an active state!

On controlled entry to the Cell, air is retained to maintain the status of the equipment, but personnel must be aware that there is stored energy and take the appropriate action to maintain safety.



Attention!

When working on the pneumatic systems of the system, depressurize the system by hand (disconnect the compressed air from the compressed air service unit).



Warning!

Exercise caution when restoring the system!

Crushing injuries may be sustained when pressure is reapplied to the cylinders during the re-start up process. Therefore, it is imperative that all safety devices are restored first and that there are no personnel or objects in the work envelope.

- Laser hazard



Attention!

Only duly trained personnel may carry out work on the system when the UV Lights are still active.



Caution
UV Light

“CAUTION – UV LIGHT”.

UV Safety Glasses provided at the access gate area should always be used to allow programming personnel to use the system in teach mode for a minimal adjustment. Full Face Mask, Overalls and Nitrile Gloves should be worn for any extended periods in the cell when the UV lights are operable.

- Noise hazard

The plant is state of the art with regards to noise reduction technology
The continuous sound pressure level of the cell is 70 dB(A) coasting at maximum speed of movement.



Ear defenders are recommended for noise levels > 80 dB(A) and are mandatory for noise levels > 85 dB(A).

Regular training courses must be held in which personnel are informed that failure to wear ear defenders can lead to permanent hearing impairment or hearing loss.

4.2.5 Control elements

For specific safety information on the PLC controls, refer to the ATG Safety Matrix documents contained within section 3.5

4.2.6 Operation - Safety Equipment

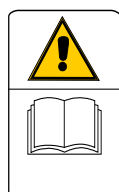
The system is equipped with EMERGENCY STOP buttons with which the equipment can be stopped in an emergency.

When an EMERGENCY STOP button is pressed, the following procedure is initiated:

All other electric drives are switched off immediately.

All pneumatic equipment has its air trapped (unless there is a safety implication)

The main switch and the controller remain switched on.



Also refer to layout for details about the quantity and locations of the EMERGENCY STOP buttons.

Safety Measures for Operation of the System in “Automatic Mode”

Before switching on or starting up the equipment, make sure that there is nobody inside the equipment area that could be at risk when the equipment components start up

Only operate the system when all safety devices or other safeguards, such as detachable safety guards, emergency stop features, etc. are mounted and are in working order

Always pay attention to moving components of the equipment while the latter is in operation.



Warning!

Risk of Injury!

Before closing the safety gates at the cell from the outside, make absolutely sure that there is nobody still in the danger zone.



Warning!

“ENSURE THE ENCLOSED AREA IS VACATED BEFORE RUNNING THIS EQUIPMENT IN AUTOMATIC”.

Instruction to warn that the equipment should only be operated in production after it has been checked to see that all personnel are clear of the area.

When operating the equipment in “Manual Mode“, make sure that there are no unauthorized persons in the danger zone.

4.3 OPERATION

4.3.1 Sequence of operation

The buffer system is controlled via a Siemens TIA 1500 PLC and housed in a new control panel MCC24. The PLC is written in TIA v15 and connected to two TP1200 12" touch screens positioned where maintenance are able to control and monitor the buffer.

The buffer has two modes of operation. A fill mode – to load bodies into the buffer and an empty mode to unload bodies from the buffer back to the line.

Fill Mode Sequence:

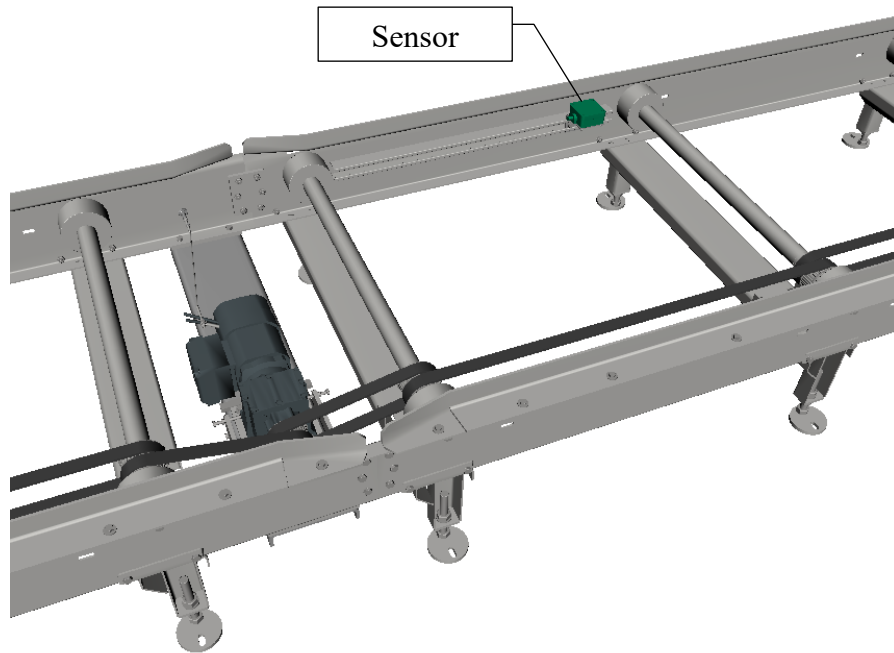
1. Power and free carrier detected at auto stop B03.
2. Read tag and check if body on carrier.
3. If empty mode selected and wrong carrier for body type is detected, carrier is exited. If fill mode is selected and the carrier is empty, the carrier is also exited. If empty mode selected and correct carrier, the skid and carrier are clamped. If empty carrier is requested from STN102 retract forks to home position.
4. Clamp carrier.
5. Check empty skid on roller bed B11.
6. Clamp skid & write tag.
7. Move skid to a position to suit body on B03.
8. Raise festo servo units.
9. Extend forks to B03.
10. Raise body off carrier B03.
11. Retract forks to B11 skid position.
12. Lower forks and place body on skid.
13. Retract forks to home position.
14. Lower festo servo units.
15. Unclamp carrier and skid.

Empty Mode Sequence:

1. Clamp skid & carrier.
2. Move skid to correct position to suit body.
3. Raise festo servo units.
4. Retract Forks to B11 skid position.
5. Raise forks to pick body from skid.
6. Extend forks to B03 carrier position.
7. Lower forks to place body on carrier.
8. Retract forks to home position.
9. Write tag.
10. Lower festo servo units.
11. Unclamp carrier and skid.

4.2.2 Powered Roller Bed

Each powered roller bed is driven by a SEW movimot drive and has up to 4 sensors to detect the skid as shown below.



S231 stop forward sensor.

S232 stop reverse sensor.

S233 slow down forward sensor.

S234 slow down reverse sensor.

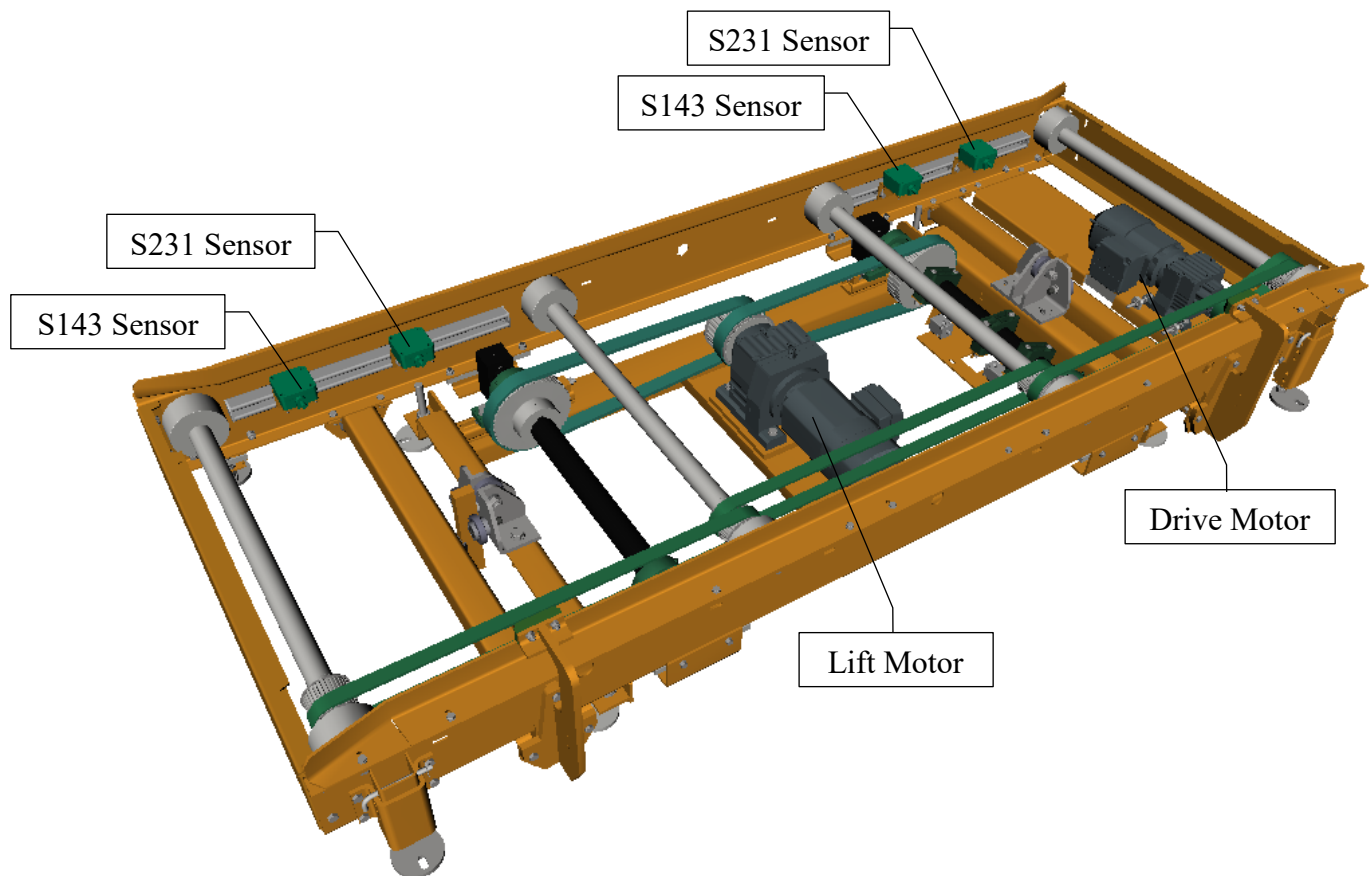
The forward direction is determined by the orientation of the body.

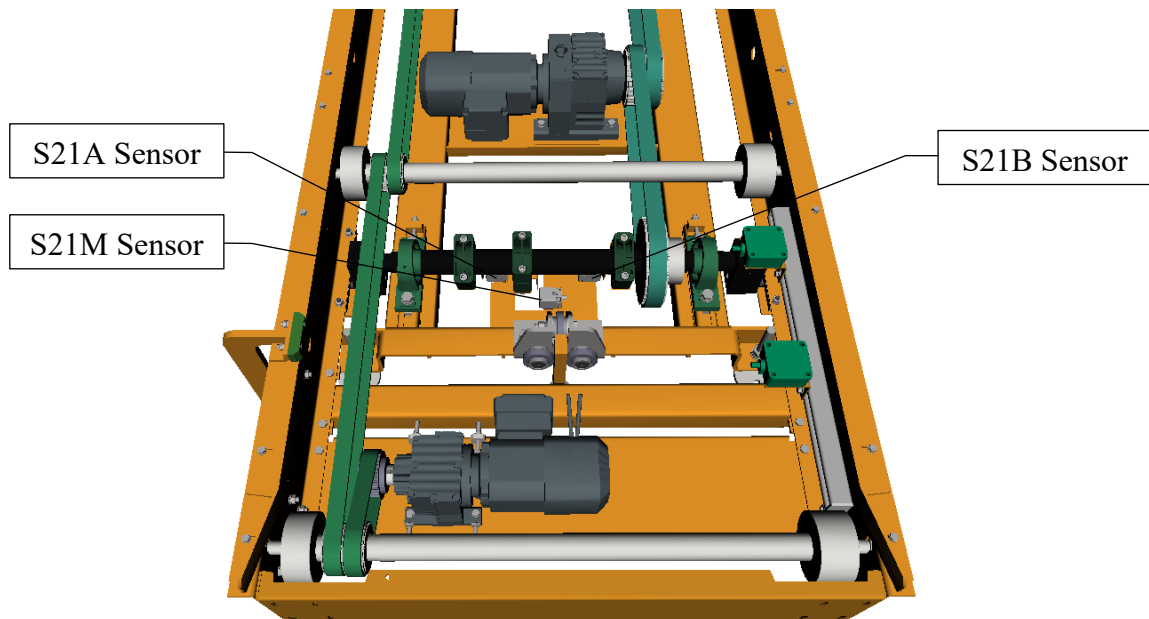
The S231 and S232 sensors check that the skid is in the correct stopping position. If the skid cannot be reversed onto the roller bed, then there is no requirement for the S234 sensor. Similarly, if the skid cannot be moved forward onto the roller bed there is no requirement for the S233 sensor. The beds at the edge of the buffer only have 3 sensors, whereas the ones in the middle have 4.

Each roller bed will have its own mini sequencer (like the auto stop sequence on the power and free conveyor).

4.2.3 Cam Lift Roller Bed

Each cam lift roller bed has the same SEW movimot and sensors as the roller bed for controlling the skid transfer between two roller beds. It also has a lift motor which is DOL (direct on line) and sensors as shown below:





S21A is activated when the lift is in the top position.

S21M is activated when the lift is at the middle position.

S21B is activated when the lift is at the bottom position.

When the lift is at the top position the skid can transfer to the roller bed. The cross transfer conveyor can run underneath if required to transfer skids between other beds. When transferring using the cross transfer conveyor the lift table is lowered to the bottom position where the skid will be sat on the cross transfer conveyor and the roller will clear. If the lift table is receiving a skid via the cross transfer it will need to be at the middle position. At this position two stoppers protrude over the cross transfer conveyor to stop the skid progressing. When the two sensors S231 and S232 are activated, this indicates that the skid is in the correct position a small-time delay is used to ensure the skid is aligned before raising the lift table to the top position.

The cam lift roller bed also receives skids via the cross transfer conveyor and has an extra sensor for this purpose.

The S143 sensor activates during the transfer and acts as a decision point to determine whether the skid can continue to the next lift table or is raised on this cam lift.

4.2.4 Cross Transfer Conveyor

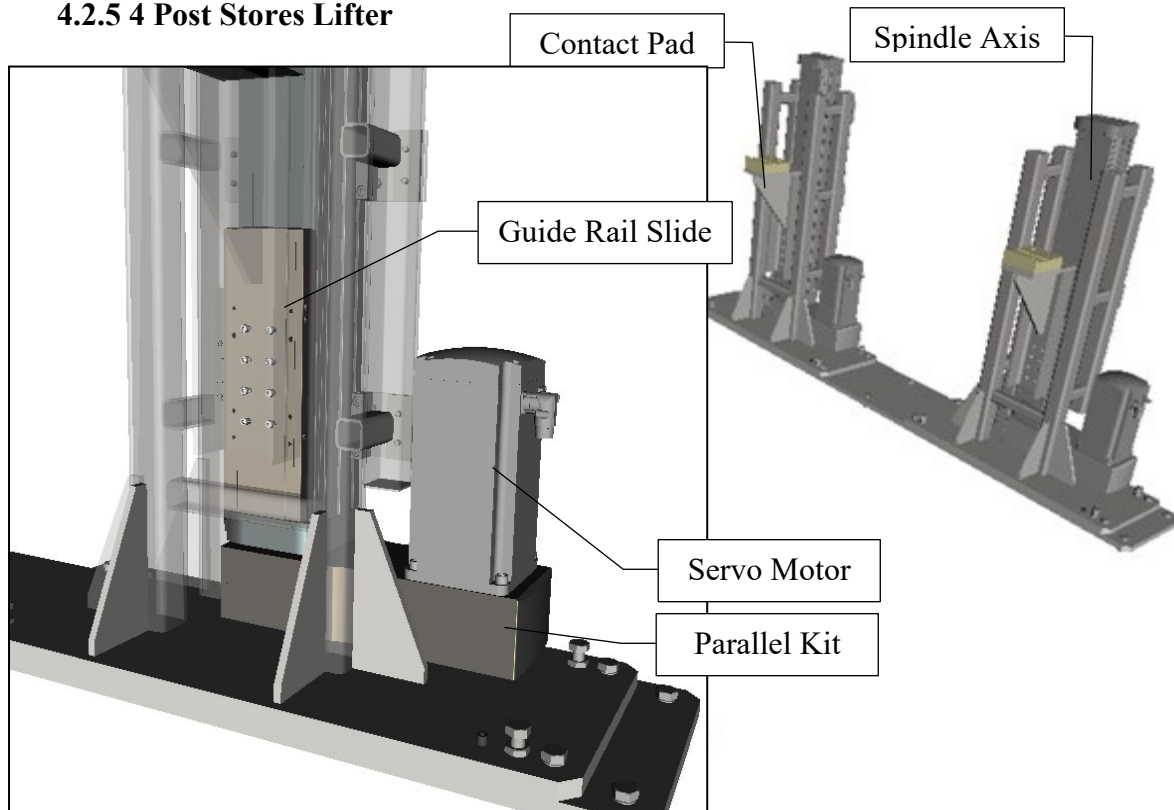
The cross transfer conveyors are controlled via a SEW movifit controller.

The cross transfer conveyors monitor all cam lift tables using the conveyor and only run if they are all in a healthy state (i.e. not in a fault condition).

The cross transfer conveyors run at a fixed speed and start-up when a transfer is required and continue to run for a period of time afterwards until no transfers are taking place.

Multiple transfers can take place at the same time.

4.2.5 4 Post Stores Lifter



The 4 Post Stores Lifter operates on receipt of a signal from the PLC to confirm that a body has arrived.

A rotary encoder on each servo motor ensures that each lifter moves simultaneously to the same position.

The parallel kit allows the servo motor to be positioned parallel to the spindle axis.

The rotary motion from the parallel kit is transferred into a linear motion in the spindle axis which drives the guide rail slide along the axis, positioning the body contact pad on to the product.

4.2.6 Springvale Envelope

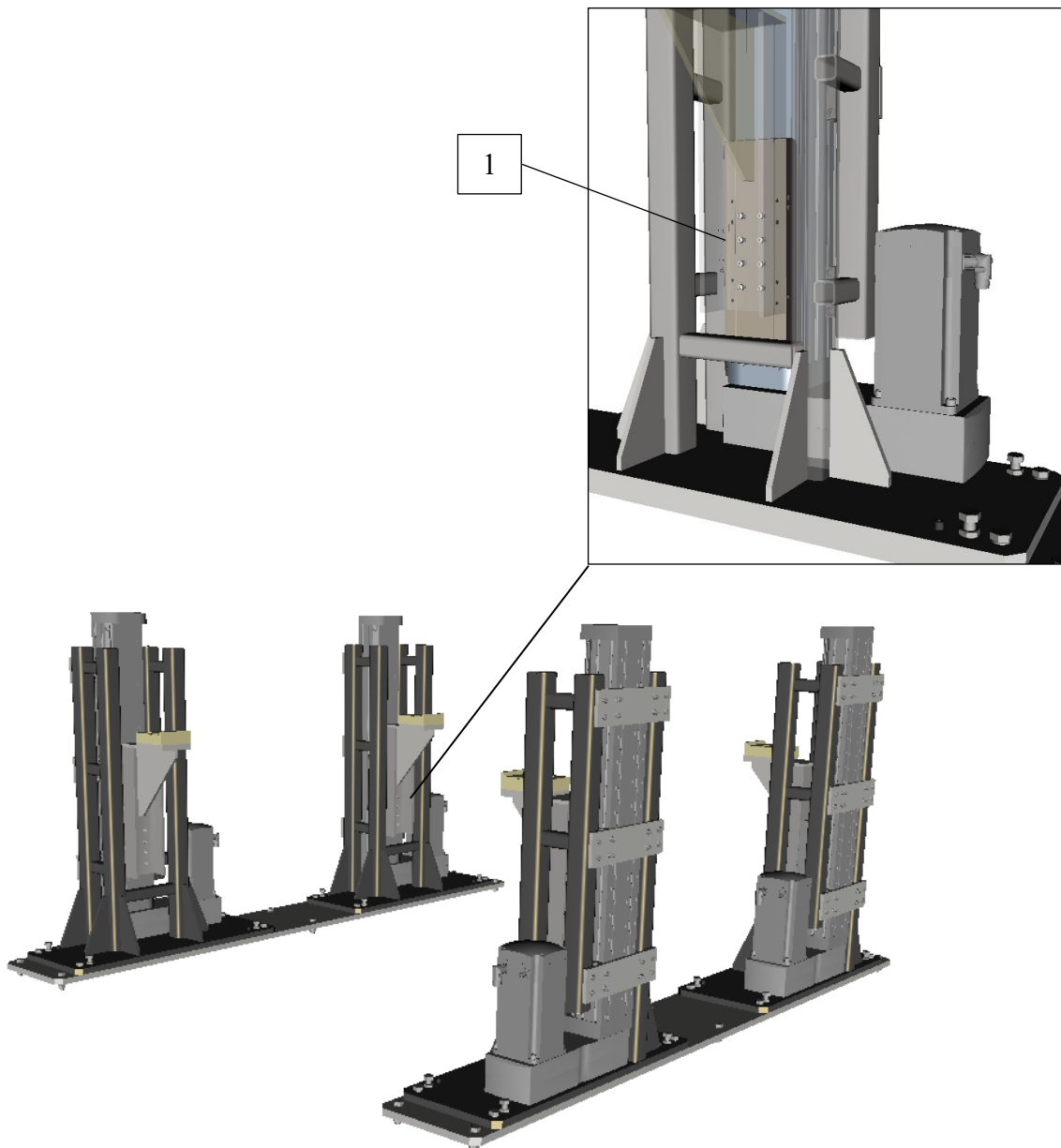
For operating information please refer to the supplier's documentation in section 10.0

For further operating information, please refer to the functional design specification.

5.0 LUBRICATION INFORMATION

	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-#####-507-00-00	4 Post Stores Lifter



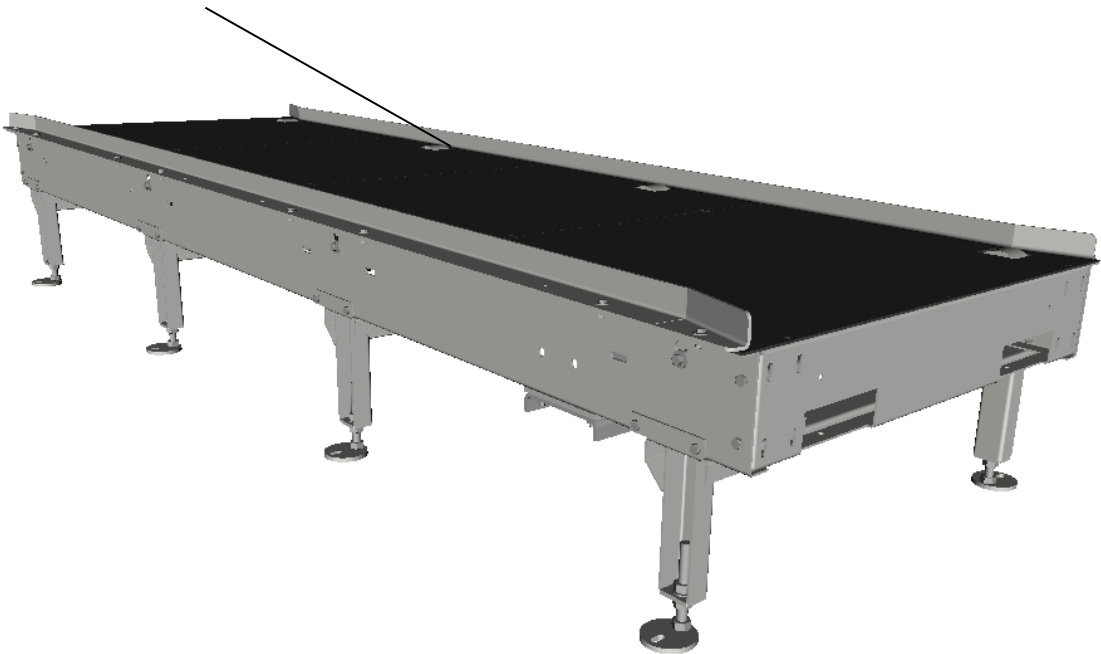
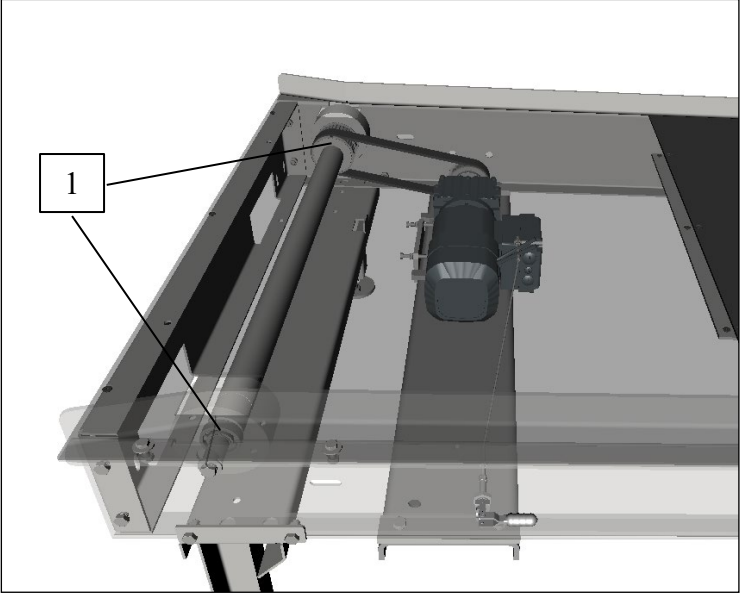
Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Guide Rail Slides	2000 hrs	Shell Avania

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-408-00-00	4 Roller Mulsanne PRB

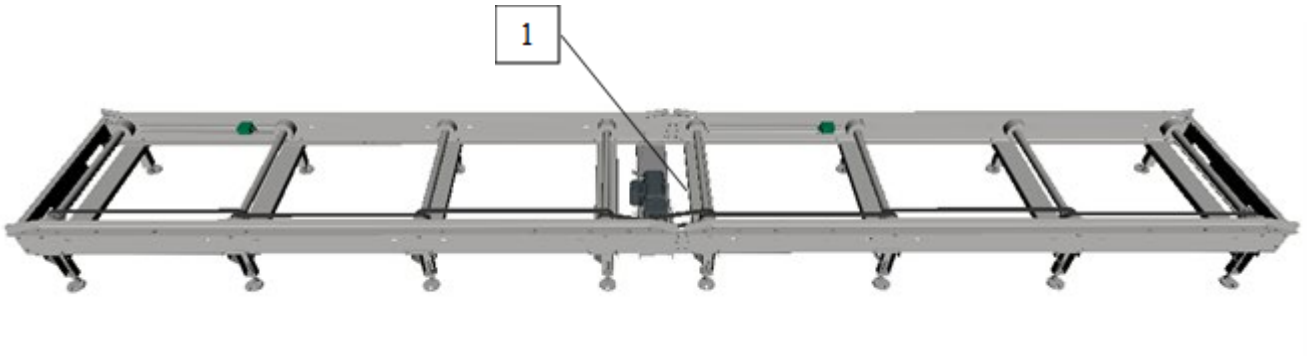


Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearings	2000hrs	Shell Avania

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-#####-404-00-00	8 Roller Stores PRB

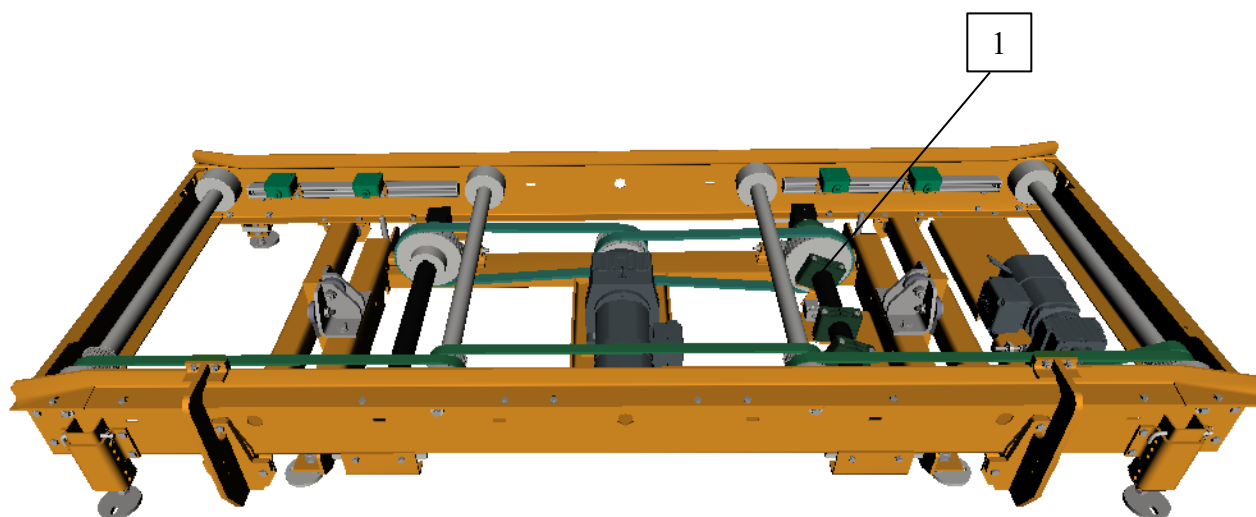


Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearing	2000hrs	Shell Avania

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-402-00-00	Cam Lifter PRB

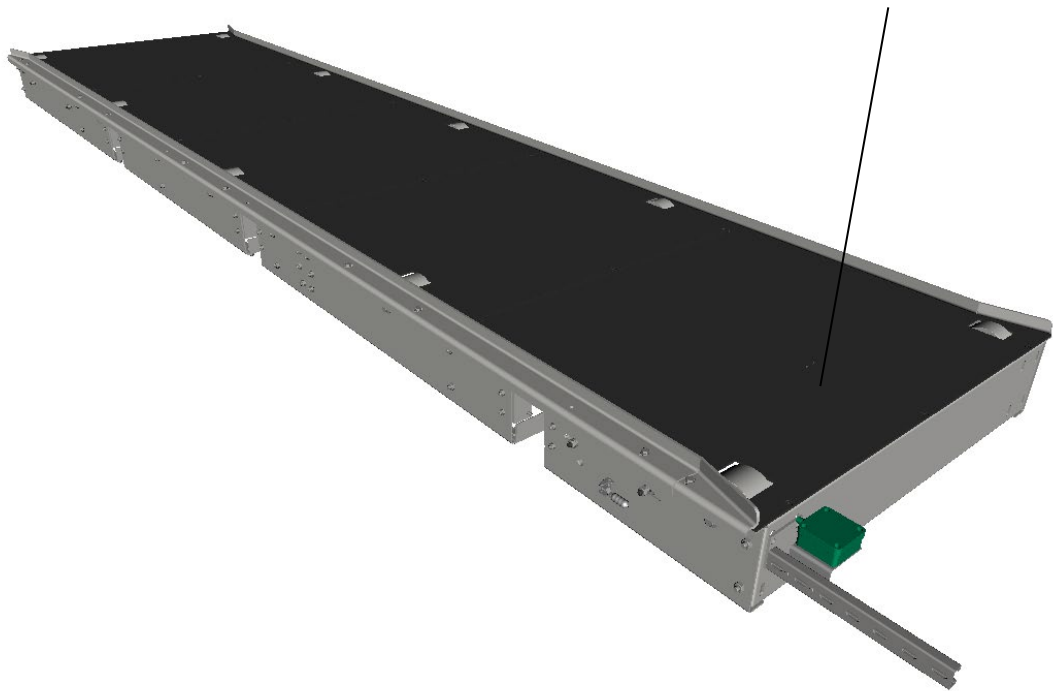
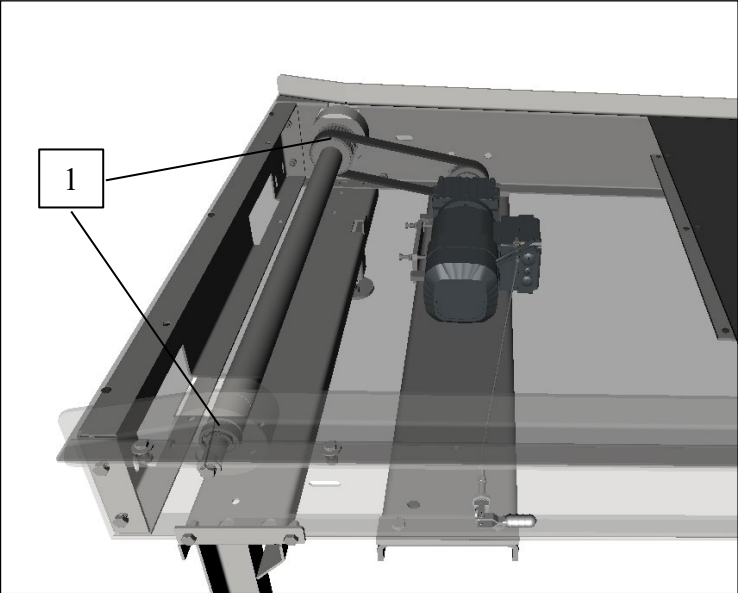


Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearings	2000hrs	Shell Avania

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-####-405-00-00	Existing Shuttle Mounted PRB

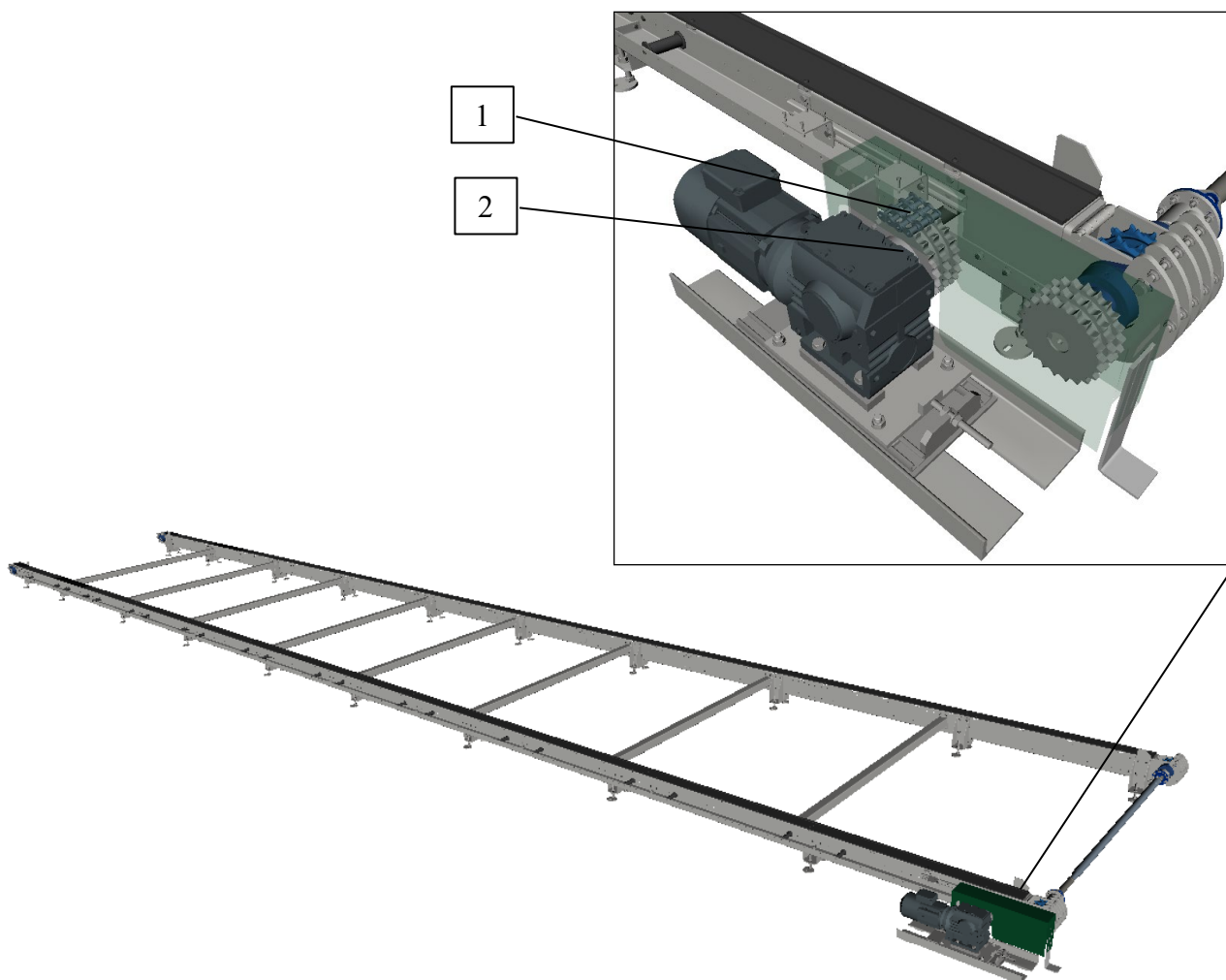


Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearings (10 off)	2000hrs	Shell Avania

demo	Revision 1
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	OPERATION & MAINTENANCE	Project No ##### ## Buffer System
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Equipment	Description
19-#####-0601-00-0002	Long Cross Transfer



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Drive Chain	600hrs	SAE 20 Motor Oil or Tygris Industrial R220
2	Bearings	2000hrs	Shell Avania

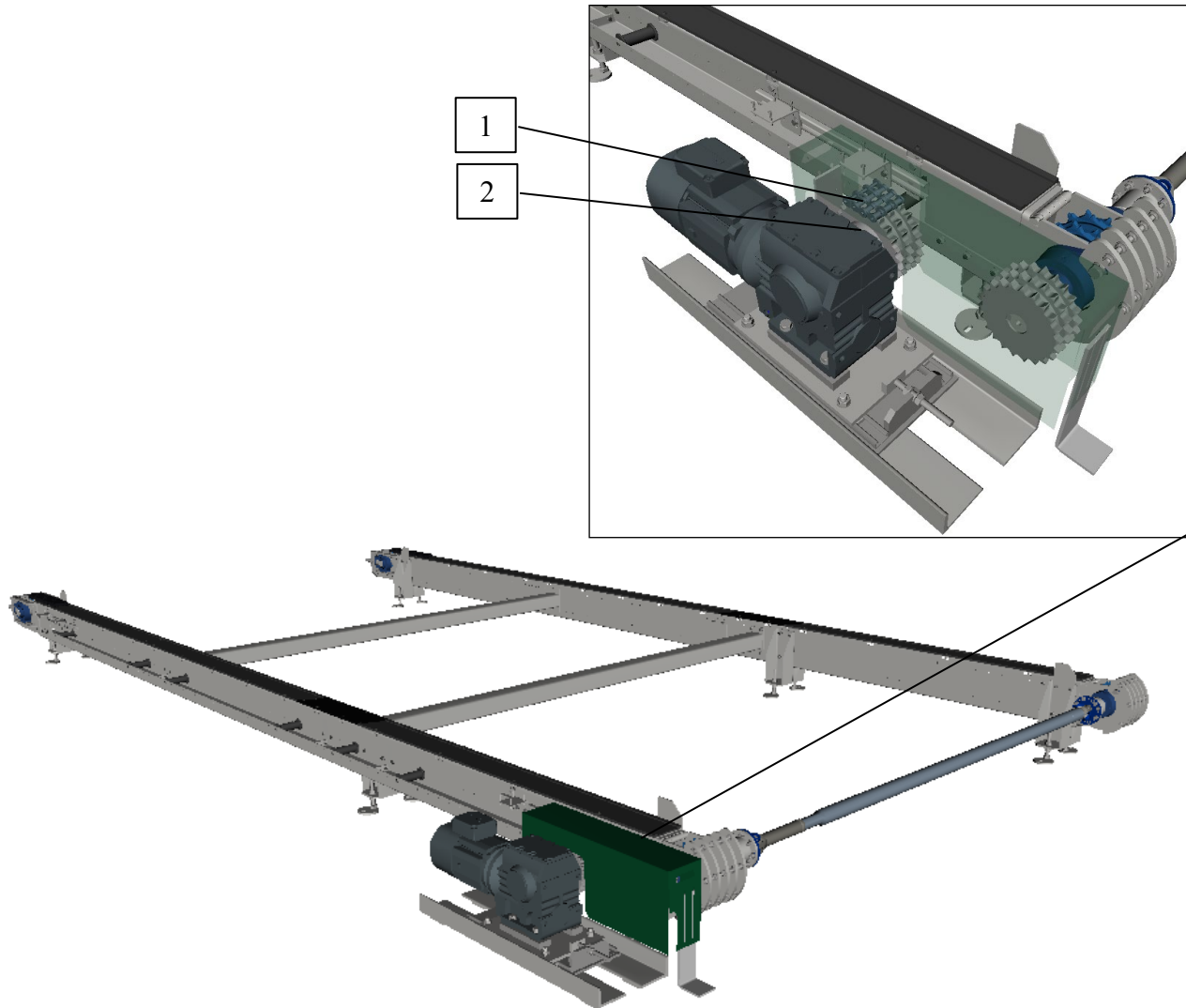
demo	Revision 1
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Project No #####
Buffer System

Equipment	Description
19-#####-0601-00-0001	Medium Cross Transfer



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Drive Chain	600hrs	SAE 20 Motor Oil or Tygris Industrial R220
2	Bearings	2000hrs	Shell Avania

demo

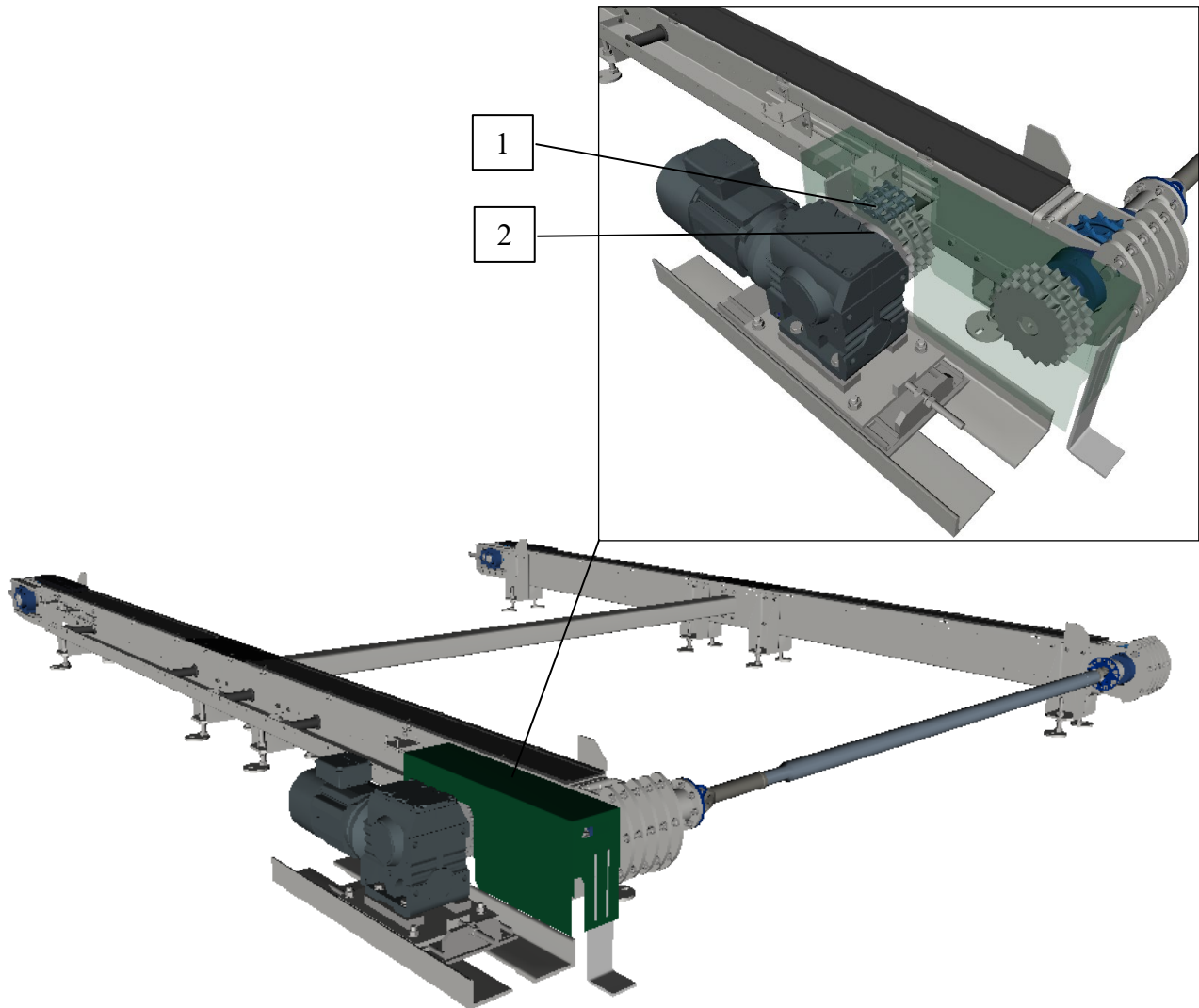
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Project No #####
Buffer System

Equipment	Description
19-#####-0601-00-0000	Short Cross Transfer



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Drive Chain	600hrs	SAE 20 Motor Oil or Tygris Industrial R220
2	Bearings	2000hrs	Shell Avania

demo

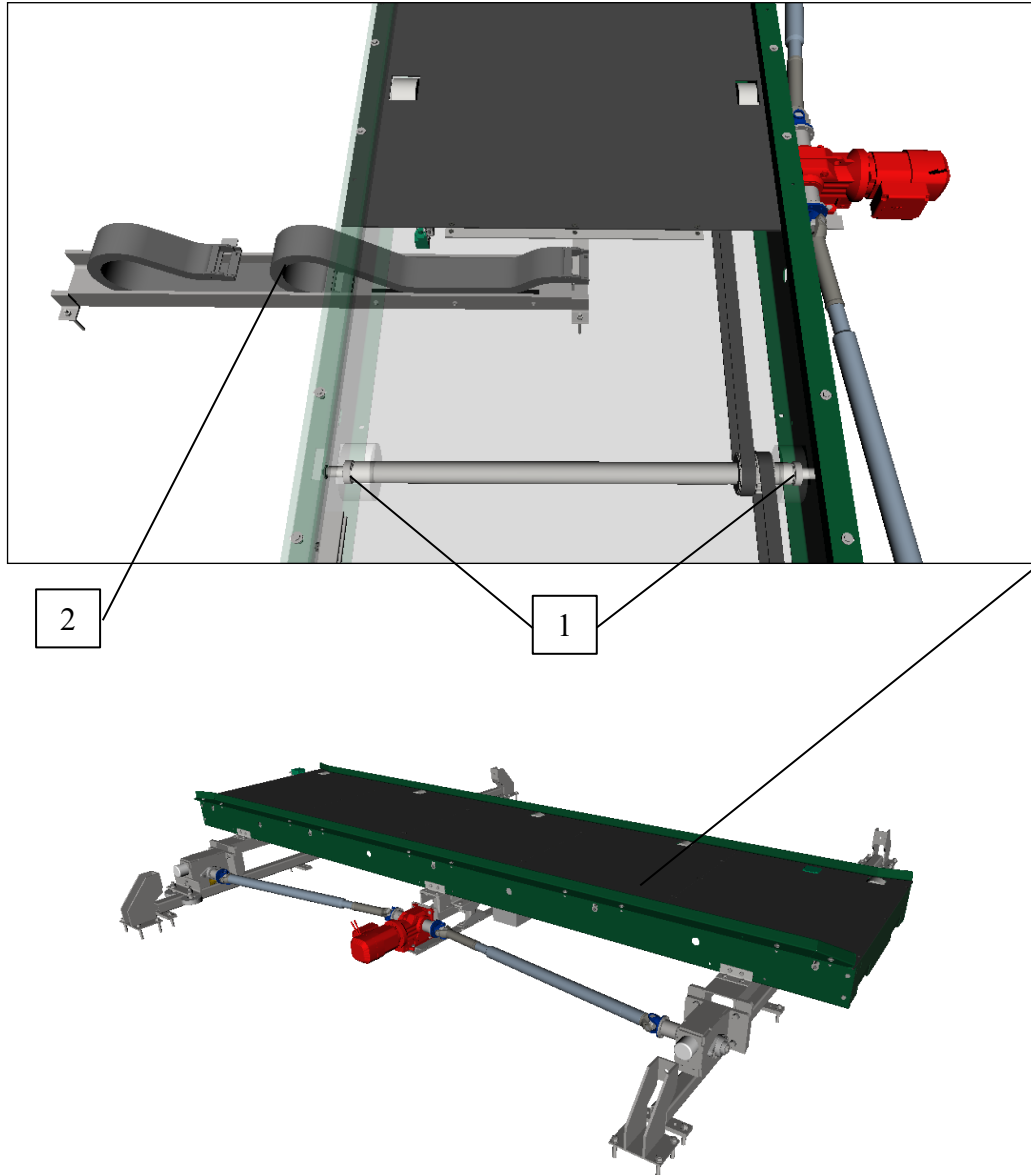
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Project No #####
Buffer System

Equipment	Description
19-#####-700-00-00	New Mulsanne Shuttle



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearing	2000hrs	Shell Avania
2	Drive Chain	600hrs	SAE 20 motor oil or Tygris Industrial R220 Chain and Wire lubricant

demo

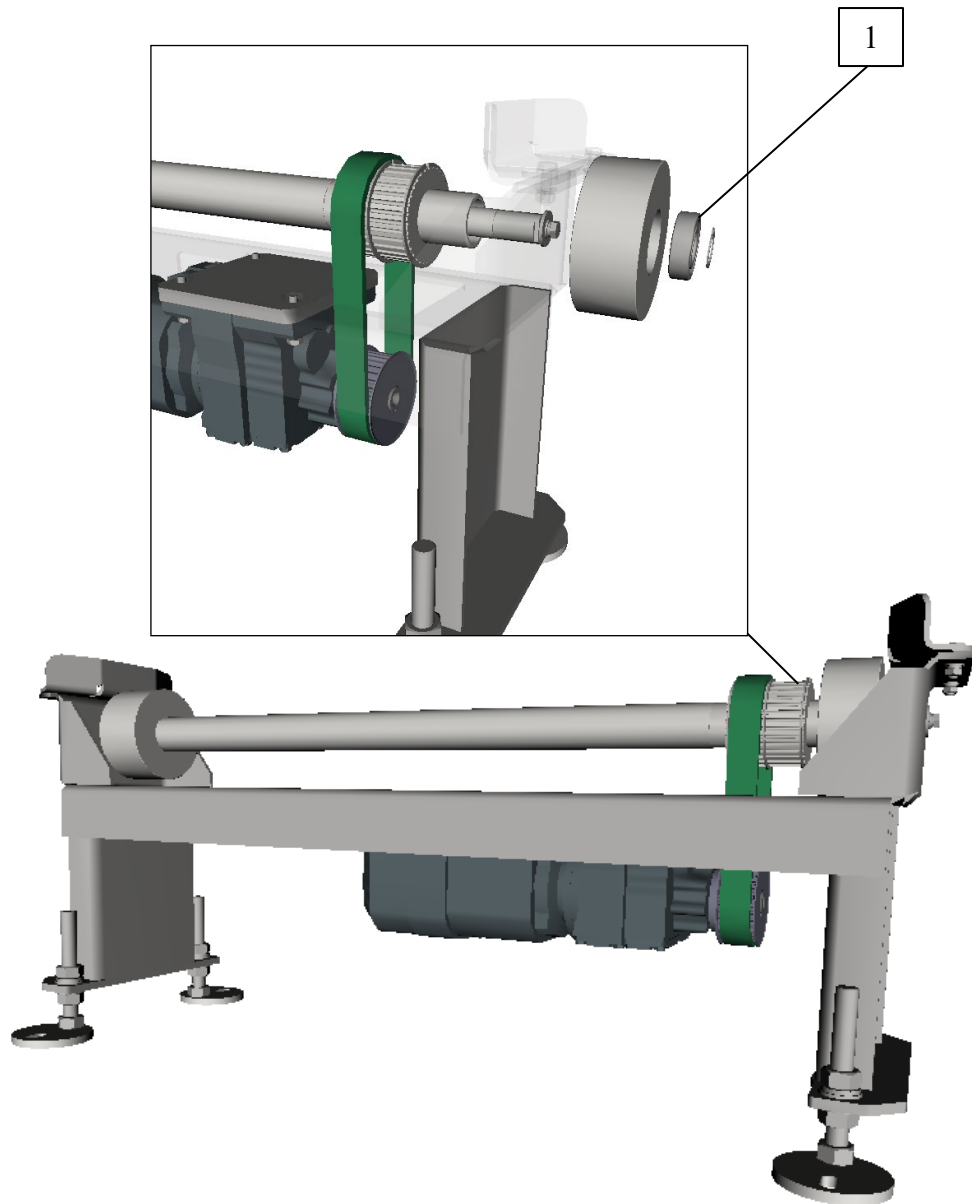
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Project No #####
Buffer System

Equipment	Description
19-####-406-00-00	Single Roller Stores PRB



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	Bearing	2000hrs	Shell Avania

demo

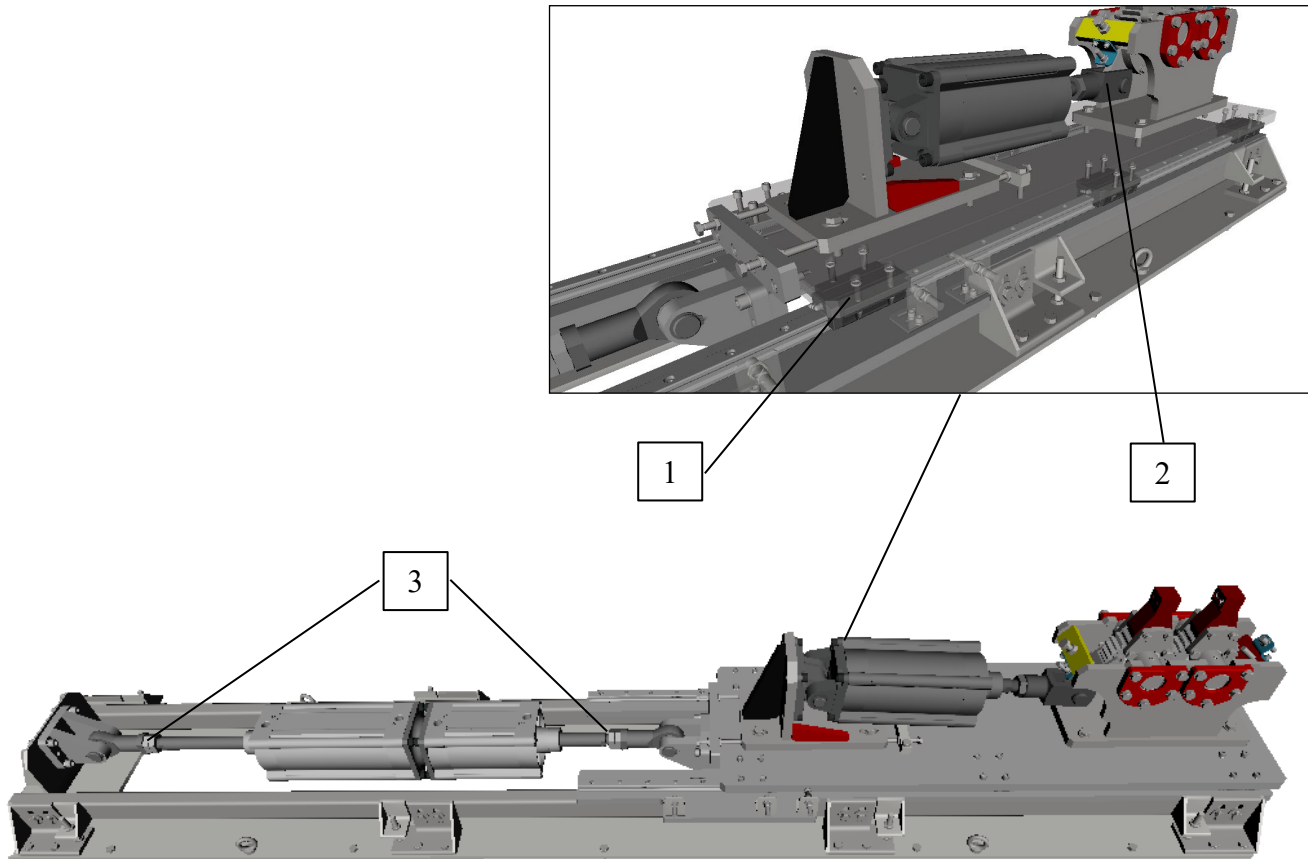
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Project No #####
Buffer System

Equipment	Description
19-####-501-05-00	Stores Skid Clamp



Point No.	Description	Lubrication Frequency	Lubrication Specification
1	THK Linear Bearings (6 off)	Monthly	Shell Avania
2	Tie Rod Ends	Monthly	Shell Avania
3	Cylinder Tie Rods	Monthly	Shell Avania

demo

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6.0 FMEA

7.0 PREVENTATIVE MAINTENANCE SCHEDULE

8.0 CE DECLARATIONS OF CONFORMITY

9.0 ELECTRICAL DATA AND SCHEMATICS