

Maintenance Manual MM

IM TL SE SD DA DB DG DF2 DR2 DT2 DX2 DL2 DM3 DS2 MA MB MG MF2 MR2 MT2 MX2 ML2 MM3 MS2 TR AP

Please consult MODU representative for further information and assistance.

Units: Dimension (mm)

General

This maintenance manual allows the users to maintain the conveyor in a proper manner which will ensure the safe maintenance, smooth operation and maximum life span of the system.

Please read and understand this manual before operate or perform maintenance on the system.

Nothing of this documentation may be reproduced in any form without the written permission of the manufacturer.

Safety Precautions



DO NOT ATTEMPT MAINTENANCE ON ANY CONVEYOR WHILE IT IS IN OPERATION.

Before Maintenance

- 1) Maintenance functions can only be performed after all electricity supply is switched off. All motor switches should be switched off and locked in the off position.
- 2) Pneumatic power must be disconnected and any pressure accumulation must be released.
- 3) Never work on a conveyor while it is running, unless maintenance procedure requires operation. When a conveyor must be operating to perform the maintenance; allow only proper trained maintenance personnel to work on the conveyor.
- 4) Remove all remaining product from the conveyor system.
- 5) Staff affected must be informed that maintenance work is being undertaken.

During Maintenance

- 1) Do not wear loose clothing while performing maintenance on operating equipment.
- 2) Be aware of hazardous conditions, such as sharp edges and protruding parts.
- 3) When using hoists, cables or other mechanical equipment to perform maintenance, use care to not damage conveyor components. Miss-aligned parts are dangerous as conveyor is started after maintenance is completed.
- 4) Keep area clean. Clean up lubricants and other materials before starting conveyor.
- 5) Must equip with Personal Protective Equipment (PPE) such as safety glass, safety shoe, safety helmet etc when performing maintenance.

After Maintenance

- 1) Before starting any conveyor after maintenance is completed, walk around the equipment and make certain all safety devices and guards are in place, pick up tools, maintenance equipment and clear any foreign objects from equipment.
- 2) Make certain all personnel are clear of the conveyor and made aware that the conveyor is about to be started.
- 3) Only authorized personnel should be permitted to start any conveyor following maintenance or emergency shut-off.

System Maintenance

Introduction

This manual is designed to provide assistance for your planned maintenance schedule. It may become evident that the suggested maintenance interval can be extended to accommodate your local environmental condition.

Maintenance of the MODU System conveyor systems shall only be done by competent/proper trained personnel who are familiar with MODU System products. If there is any doubt, please consult your MODU System product supplying agent.

Non-MODU System Product

Products or system which are not from MODU System family of products, its maintenance shall be carried out accordance with their respective manufacturer's instructions.

Maintenance Instructions

Introduction

This maintenance manual contains maintenance guide for MODU System standard component as listed in MODU System Product Catalogue. For non MODU System components such as motors, sensors, pneumatic components, control systems etc., the manufacturer maintenance instructions apply. This manual does not include maintenance instruction for equipments which customer has chosen and specified for fitting to the installation.

Recommended Spare Part List

Recommended spare parts list is shown in Appendix A. User of MODU System conveyor system shall keep at least a complete set of recommended spare parts. If there is a demand for spare parts, please contact MODU System or your supplying agent.

Maintenance Schedule and Inspection Guidelines

A suggested maintenance schedule and inspection guidelines are shown in section 4 Maintenance Guides.

Warranty

MODU System conveyors are covered by warranty as agreed within the trading term and / or Order Acknowledgement

Maintenance Guides

Maintenance Schedule

MODU System conveyors are designed to run 24 hours per day, 7 days per week, with minimum maintenance. For non MODU System components such as geared motors, sensors, pneumatic components, control systems etc., the manufacturer maintenance instructions apply.

Table below shows MODU System conveyors the maintenance schedule.

No	Section	General checks	No of operating hours / time interval
1	Drive Unit	Check sprocket, chain return guide, chain guards and lubrication.	First 50, 250 and 500 hours. Then every 500 hours.
2	Idler End	Check chain guides and chain guards.	Every 1 000 hours.
3	Chain	Clean.	Every day.
		Check wear or crack.	Every 2000 hours.
		Check tension.	First 40 and 200 hours. Then every 1600 hours.
4	Slide Rails	Check slide rails at horizontal and vertical bends.	Every 200 hours.
		Check and clean slide rails of the conveyor system.	Every 1500 hours.
6	Safety Features	Check for function as required.	At least once a year.

Troubleshooting Guidelines

In the course of conveyor operation, periodic inspection of the conveyor system is required to prevent any breakdowns and failures. MODU System conveyors should be inspected while the system is running as well as when it is shut down.

Table below shows MODU System troubleshooting guidelines

c	Cause	Correction
Jerky running	Damaged or badly fitted slide rail.	Inspect and replace as necessary.
	Conveyor chain is too tight/loose.	Tension conveyor chain correctly.
	Dirty conveyor.	Clean conveyor chain and slide rail. Lubricate with silicone based lubricant.
Noise	Worn or damaged bearings in drive unit.	Check/replace drive unit.
	Damaged/badly fitted slide rail.	Check the free running of the chain, especially in slide rail joints.
	Excessive conveyor speed.	Lower speed. Check actual load against recommended loading.
	Incorrect conveyor chain tension	Tension conveyor chain correctly.
Motor overheating on drive unit	Overloaded conveyor.	Remove products from conveyor and test run. Check actual conveyor load against recommended loading.
	Gearbox leaking oil.	Check output shaft seal and area around motor/gearbox interface.
	Dirty conveyor.	Clean the chain and slide rail.
Abnormal wear on plastic parts	Overloaded conveyor.	Remove products from conveyor and test run. Check the free running of the conveyor chain. Check actual conveyor load against recommended loading.
	Ambient temperature too high	Check against recommended temperature for conveyor.
	Chemicals in the environment are affecting plastic parts.	Check in MODU System catalogue (section TR) for listing of incompatible chemicals.
	Damage due to ingress of contaminate	Clean the system.
	Particles, swarf etc.	Remove source of contamination.
Drive unit is running, conveyor chain is not	Friction disc in slip clutch are worn or contaminated.	Check and replace if necessary.
	Transmission products are not fitted.	Check and fit.

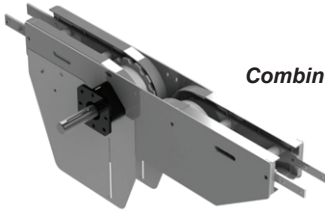
Drive Unit type and Applications.

There are five (5) different types of drive unit, namely Front Drive Unit, Combined Drive Unit, Suspended Drive Unit, Catenary Drive Unit and Intermediate Drive Unit.



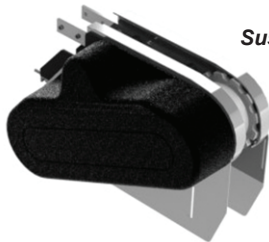
Front Drive Unit

Front Drive Unit with return chain, located at the "pulling" end of the conveyor. This drive unit is applicable for all conveyor series.



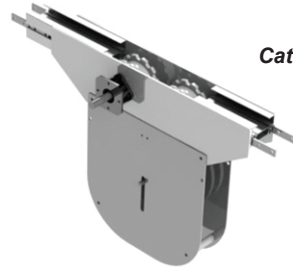
Combined Drive Unit

Combined Drive Unit with return chain, located at an intermediate position along the conveyor. This drive unit is applicable for all conveyor series.



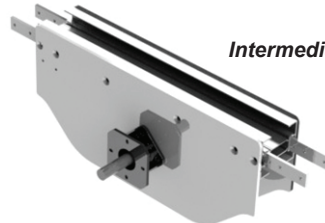
Suspended Drive Unit

Suspended Drive Unit with return chain, located at the "pulling" end of the conveyor. This drive unit is applicable for MS2, MM3 and ML2 only.



Catenary Drive Unit

Catenary Drive Unit without return chain, located at an intermediate position along the conveyor. This drive unit is applicable for MM3 only.



Intermediate Drive Unit

Intermediate Drive Unit with return chain, located at an intermediate position along the conveyor. This drive unit is applicable for MS2, MM3 and ML2 only.

Inspection of Drive Units

Roller Chain Transmission

The roller chain transmission (Suspended drive) should be checked and lubricated after 50, 250 and 500 hours of operation, and then every 500 hours.

If the roller chain transmission are not fitted with a tensioner it should be checked on this occasion. At the same time as the tension is checked, the roller chain must be lubricated.

If the transmissions are fitted with a chain tensioner, lubrication of roller chain should only be carried out at the stated interval. The condition of the chains must be checked at the same time.

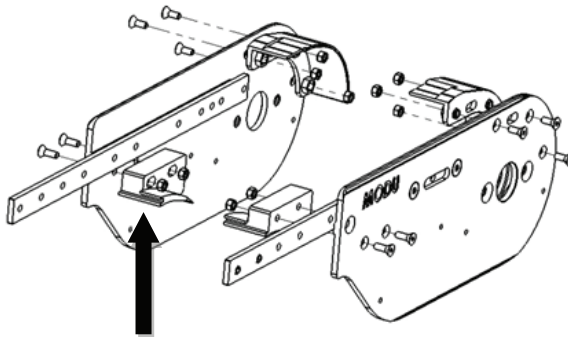
Geared Motor

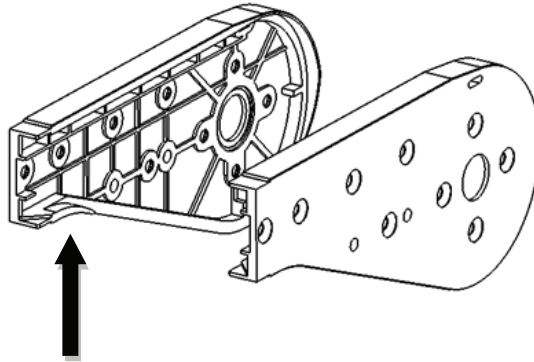
The geared motor should be checked in accordance with the instructions from the relevant supplier.

Guide for the Conveyor Chain.

The purpose of the guide for the conveyor chain is to guide the return chain correctly into the drive unit.

Fully guided drive unit do not have guides. On these, no slack is allowed at the drive unit since the conveyor chain is being controlled all the time. Special attention must be given to chain elongation in conveyor of this configuration. Example of conveyor of this configuration is gripper conveyor.





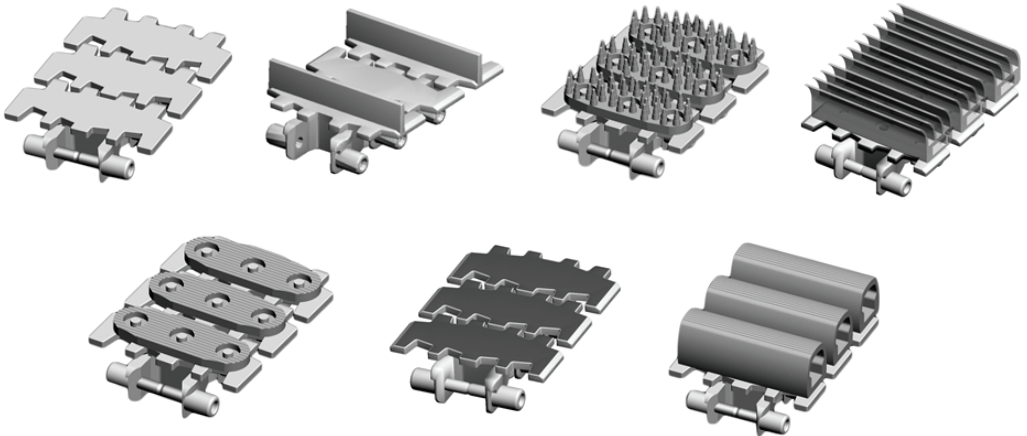
General Check on Drive Unit

Carry out a general inspection of the drive unit:

1. Check particularly that the protective covers for the conveyor chain are complete and firmly in place.
2. Replace damaged/worn parts.

Inspection of Conveyor Chains

Friction Chain, Cleated Chain, Flocked Chain, Finger Gripper Chain, Box Gripper Chain and Wedge Chain are special chains should be inspected regularly and any defective dirty links must be replaced and cleaned.



Types of MODU Conveyor Chains

Caution!

Only warm water (50°C), with soap if necessary, may be used for cleaning conveyor chain.

Checking the Tension of Conveyor Chain

The chain is made of elastic material. The chain eventually stretches as the material creeps. The extent of the stretch depends on the traction force in the chain. The stretch shows itself as slack on the return side of drive unit.

The tension of the chain should be checked after 40 and 200 hours of operation and thereafter every 1600 hours.

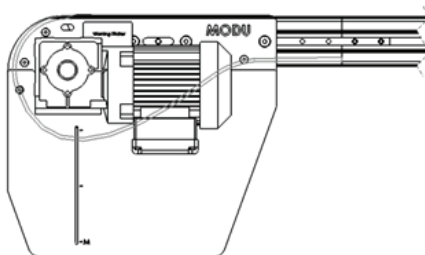
In operation there will be some slack in the conveyor chain. How much slack is acceptable depends on the length of the conveyor chain. The most suitable places to check the slack in the chain is at the drive unit

Important!

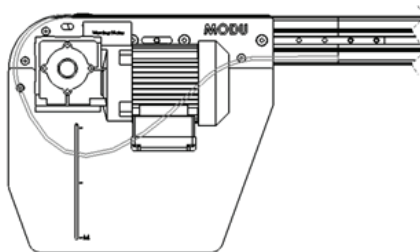
The chain should be pre-tensioned while the conveyor is stationary, but must never be so tight that there is no slack during operation. There should be no appreciable slack on the chain when the conveyor is stationary. This can, however, vary depending on the total length of the chain. If there is too much slack, there will be excessive wear on the chain guides and the chain. This could be a risk for injury.

If the slack on the conveyor chain is unacceptably high, it must be shortened by splitting the chain and removing necessary number of links.

If the conveyor has a fully guided drive unit with no chain slack take up, the elongation of the chain has to be monitored even more carefully, to ensure a trouble free operation.



The conveyor chain does not need to show any slack when the conveyor chain is stationary.

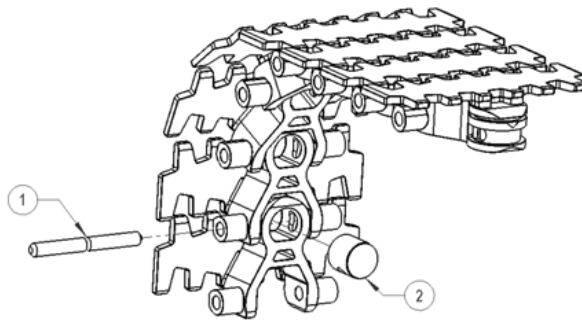


The conveyor chain must show some slack during operation.

Shortening Conveyor Chain

Instructions

1. Make the conveyor chain accessible at some of the overhead positions.
2. Remove the steel pin (1) from the pivot (2). Use the pin insertion tool.
3. Remove the necessary number of links.
(Note: With cleated or plain chains, pay attention to the divisions between links.)
4. Join the chain together with a new pivot.
(Note: the old pivot should not be re-used. When the chain is divided, a new pivot must always be fitted.)
5. Insert the steel pin using the pin insertion tool.
6. After inserting the steel pin, check that it is centered and that the chain easily bends in the fitted link.



Chain Joint Components

Inspection of Slide Rails, Beams, Idlers and Bends

Checking Slide Rail

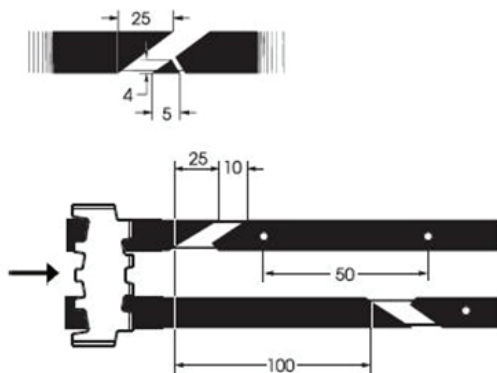
The condition of the slide rails is fundamental to the functioning of the installation. It is therefore essential that these are in good condition.

Checking the Slide Rail with the Conveyor Chain in Place

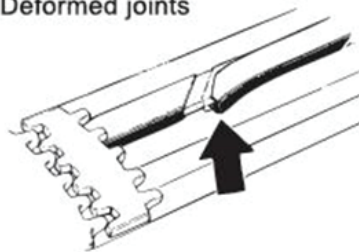
The slide rail must be checked after every 200 hours' operation. Carry on the checking on a stationary conveyor with the chain in place.

1. Check the fastening points on the slide rail.
2. Check the joints on the slide rail. Below shows correct configuration of joints.
3. Check that there is a gap between the slide rails and that the joints are correctly fitted.
4. Check that the joints are not deformed.
5. Check that the slide rail has not been broken off.

Replace the slide rail if necessary.



Deformed joints



Checking the Slide Rail, Conveyor Chain Removed

At least once a year or after every 2000 hours' operation, the chain should be removed from the beam and the slide rail carefully checked for wear and fastening.

Plain bend should be checked after every 500 hours' operation, since these are subjected to higher loads.

1. Carry out the same checks as were carried out during "Checking the Slide Rail with the Conveyor Chain in Place".
2. Check the slide rail for wear and tear.

Check in particular the inner slide rail in plain bends, since the stresses here are particularly high.

1. Check the slide rails for scratches and notches.
2. Replace the slide rail and fasteners if necessary.

Wash the conveyor chain.

Conveyor Beams, Idler Ends and Bends

The conveyor beams themselves do not normally require and regular inspection. Be observant for damage arising from external factors, warping or deformation. Deformation can cause the conveyor chain to jam, resulting in uneven running.

Idler ends and wheel bends do not normally require any special inspection, but they should be checked when the slide rails are inspected.

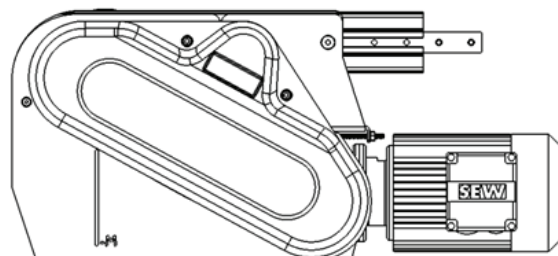
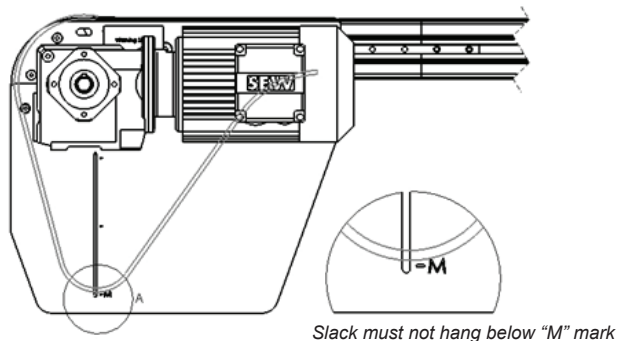
Large radius plan bends may have inner support rails fitted to the beam. Ensure that these rails (if fitted) are not worn, paying particular attention to the "lead-in" area.

Inspection of Safety Features

Protective and Safety Features

Safety features should be checked at regular intervals.

1. Check the chain guard for roller chain or timing belt transmission. This guard must always be in place when the conveyor is running.
2. Check the protective cover on the cleated chain conveyor return chain.
3. Drive units have a slack protection for the conveyor chain. Check the slack protection plates are in place and that the chain does not slacken enough to hang below the "M" mark on protection plates.
4. There may be other types of guard which are specific to your installation and these must also be inspected.



Chain guard for roller chain or timing belt

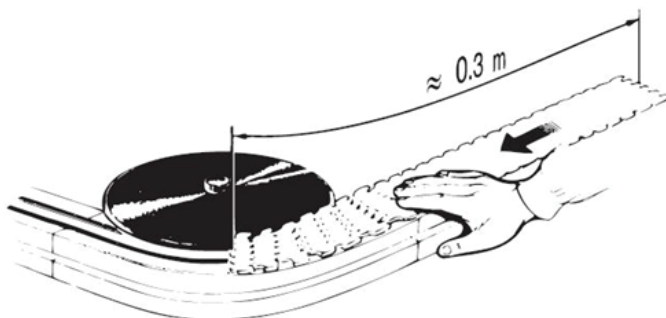
Replacement of Worn Conveyor Chain

Removal of Conveyor Chain

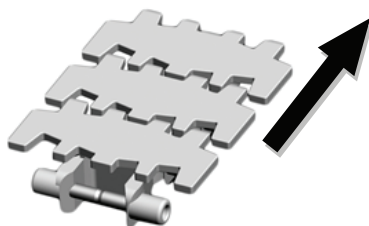
1. Ensure that the power to the drive motor is disconnected.
2. Disengage the motor; there are various methods depending on the type of drive unit.
3. Split the chain by removing the steel pin from the pivot. Use the special tool for insertion or removal (see Shortening Conveyor Chain section).
4. Pull out the chain.

Fitting the Conveyor Chain

1. Run a sample, approximately 0.3m of conveyor chain through the installation in the direction of the conveyor. Check that the chain moves easily and correctly through the bends and idlers ends. Check at the same time that there is enough space for chain.
2. Put the new conveyor chain in place. Check that the chain direction corresponds to the conveyor direction.



Checking of Conveyor Chain Space



Conveyor Chain Direction

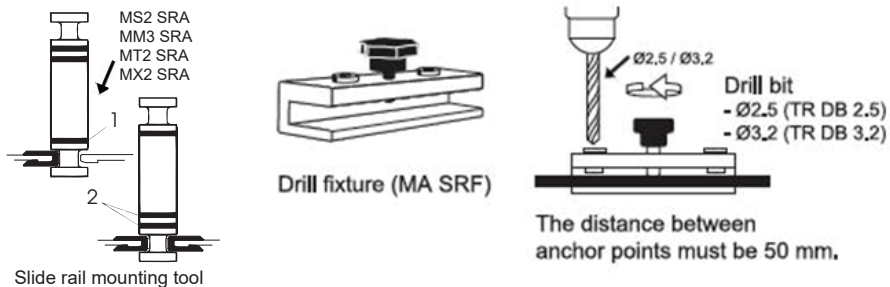
Replacement of Worn Slide Rails

Replacing Slide Rails

It is very important the assemble slide rail correctly to ensure smooth system operation.

Follow the illustrated instruction on the following pages carefully. Observe the following points:

1. Slide rail cutter – single cut pliers are suitable tools for cutting the slide rails.
2. Use slide rail mounting tools.
3. Use drill fixture.
4. Use a high quality drill bit to avoid forming a shoulder, preferably one which is intended for drilling aluminium.



When fitting the slide rails with rivets, applicable for MS2 and MM3 series, the fitting instructions in following pages must be followed.

1. The joints on the slide rails must have a distance of 100mm between them. The joints should be laid out as in the picture with gap of approximately 10mm between the rails.
2. Joints may not be positioned in bends, or in the transition between two sections of beams.
3. The slide rails should normally be approximately 5m long on a straight conveyor beam. In a bend, the maximum length of slide rail should be 3m.
4. The joints should be positioned a minimum of 500mm before an idler end unit, drive unit or vertical bend. The slide rail must overlap the recess in the idler end and drive unit.
5. The inner slide rail after a wheel bend must be cut so that the cut surface is parallel to the wheel. In front of the wheel bend, the slide rail will normally be cut at 45°.

Note:

Check final slide rails visually, as well as running a section of conveyor chain through the installation.

Another method of installing slide rail is using screw, applicable for ML2 and MX2 series. Please see following pages for fitting instructions.

Slide Rail Fixing Instructions

Fixing Slide Rail to the Conveyor Beam

The beginning of each slide rail section must be fixed to the beam, since the chain will cause the slide rail to be pushed forward. Slide rail which moves into a wheel bend or a drive unit can block the chain completely.

There are two different methods for fixing slide rail to the conveyor beam:

1. Using rivets (MA RR 3), this is applicable for MS2 and MM3 series only.
2. Using screws (MA RS 6.5), this is applicable for ML2 and MX2 series only.

Method 1 - Using Rivets, Applicable for MS2 & MM3 Series only

Step 1



Drill through holes on slide rail.

Step 2



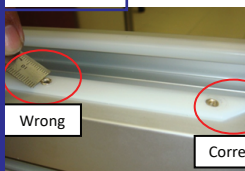
Countersink on slide rail.

Step 3



Insert rivets in the holes, using rivet crimping tools (MA RC)

Step 4



Check that the rivets do not protrude over the surface of slide rail. Check both top and underneath surface of slide rail for protruding metal.

Step 5



Complete fitting slide rail.

Method 1 - Using Screws, Applicable for ML2 & MX2 Series only

Step 1



Drill through holes on slide rail.

Step 2



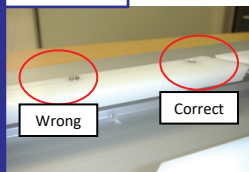
Countersink on slide rail.

Step 3



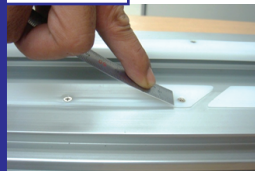
Apply screws into the holes.

Step 4



Check that the screw do not protrude over the surface of slide rail. Check both top and underneath surface of slide rail for protruding metal.

Step 5



Complete fitting side rail.

