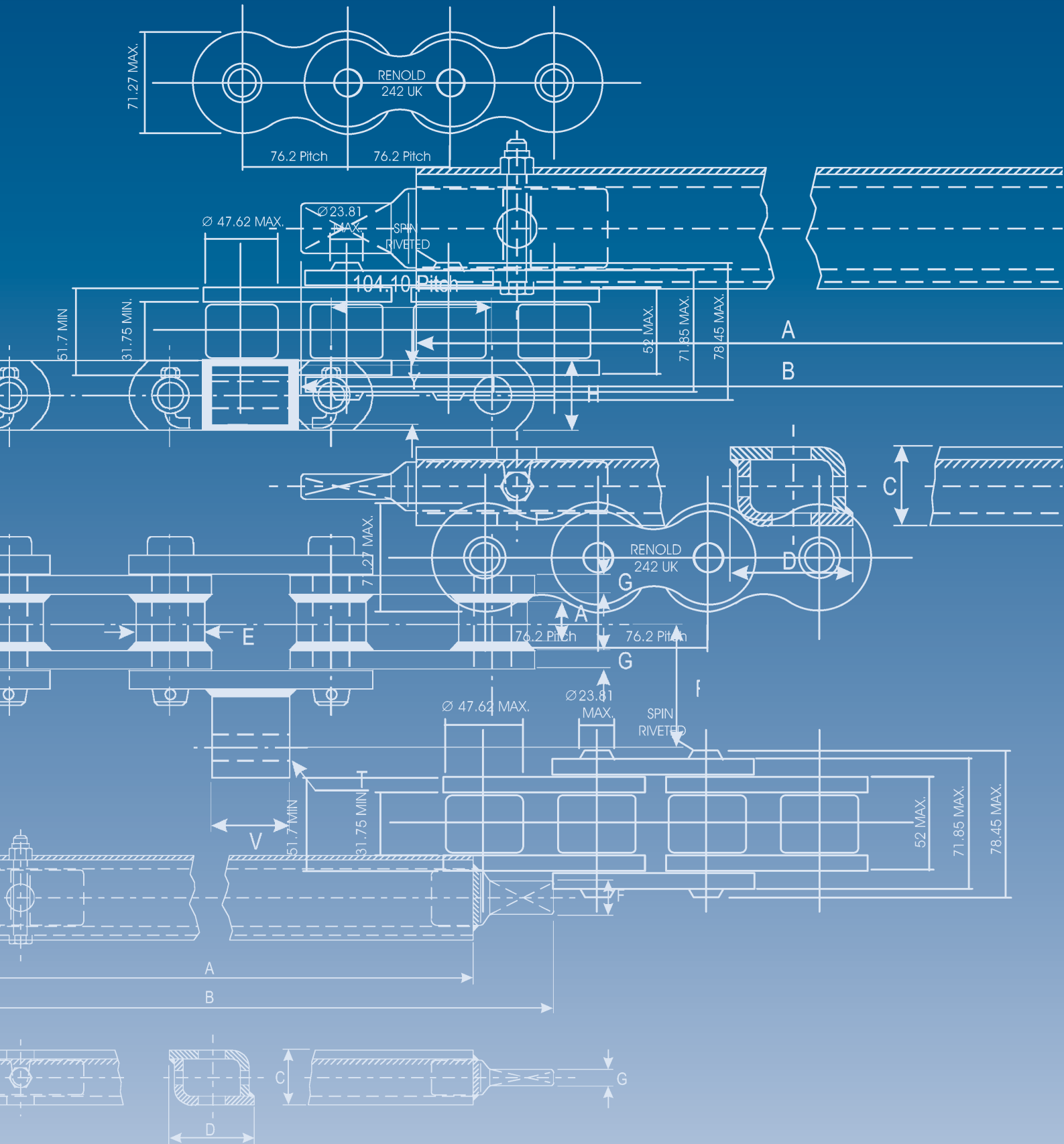


BRITNOR



Mining Catalogue



RENOLD

AUSTRALIA

Specialists in Mechanical Power Transmission, Chains, Gearboxes, Couplings and Hydraulic Systems & Components

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Quality, Reliability and Availability.

The Renold name has been associated with industry since 1879, when Hans Renold designed the first roller chain. The company he formed now designs and manufactures a wide range of high quality mechanical power transmission and chain products.

Renold Australia and New Zealand are wholly owned subsidiaries of Renold PLC which is listed on the London Stock Exchange. It is one of the world's largest suppliers of mechanical power transmission and chain products with 15 factories in 7 countries, operations in 17 countries and distributors in over 70 countries.

Renold has been manufacturing in Australia since 1949, with an extensive branch network in place since 1958. In New Zealand, Renold products have been available since 1922 and Renold now has branches in Auckland and Christchurch, a factory in Auckland and an extensive network of distributors throughout the country.

Over the years, in response to customer demand, Renold Australia and Renold New Zealand have expanded their product ranges to include hydraulics, steel and plastic table top chains, roll-ring chain tensioners, large helical and bevel/helical gearboxes and disc brakes.

Renold today is much more than a catalogue of products. Importantly, we like to work closely with you in understanding your objectives and your problems, in order to provide the best engineered solution for your needs.

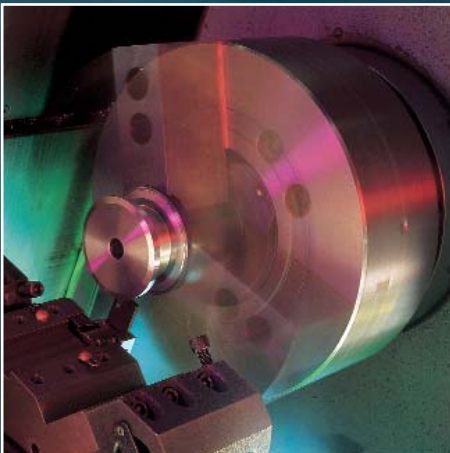
Testament to this is the research and development that Renold has undertaken to provide a new generation of Renold Synergy Transmission Chains.

Renold provides engineering solutions for industry – total drive packages, covering the whole spectrum of mechanical and hydraulic power transmission – saving you time and money.

At the same time, we back you with an Australasian network of sales and service support teams to ensure you meet your deadlines – and we meet your expectations.

More than A\$7 million of product is warehoused in Australia and New Zealand at any one time to facilitate faster delivery service.

Renold today...
an ongoing
commitment
to quality and
service.



Reclaimer Chains

Typical Chains or Stacker/Reclaimer applications.

These chains are designed and manufactured in Australia by Renold at its Melbourne factory.

Illustrated are just some of the more common types of chain, but there are many varieties available, including chain custom-made to your needs.

Features/Benefits

- Chains custom designed and manufactured to meet individual customer application and requirements.
- High wear resistance, giving extended chain life from careful selection of materials, combined with controlled heat treatment of components, high surface hardness and specially machined bush profiles.
- Minimum breaking load gives you peace of mind.
- Excellent bush security from tight manufacturing tolerances, plate hole accuracy and surface finish.
- Substantially improved fatigue life through high interference fits, tightly controlled plate hole quality and fatigue resistant materials.
- Reduced sprocket wear via strict control of pitch accuracy, resulting in excellent sprocket gearing, lower friction and lower noise levels in operation.





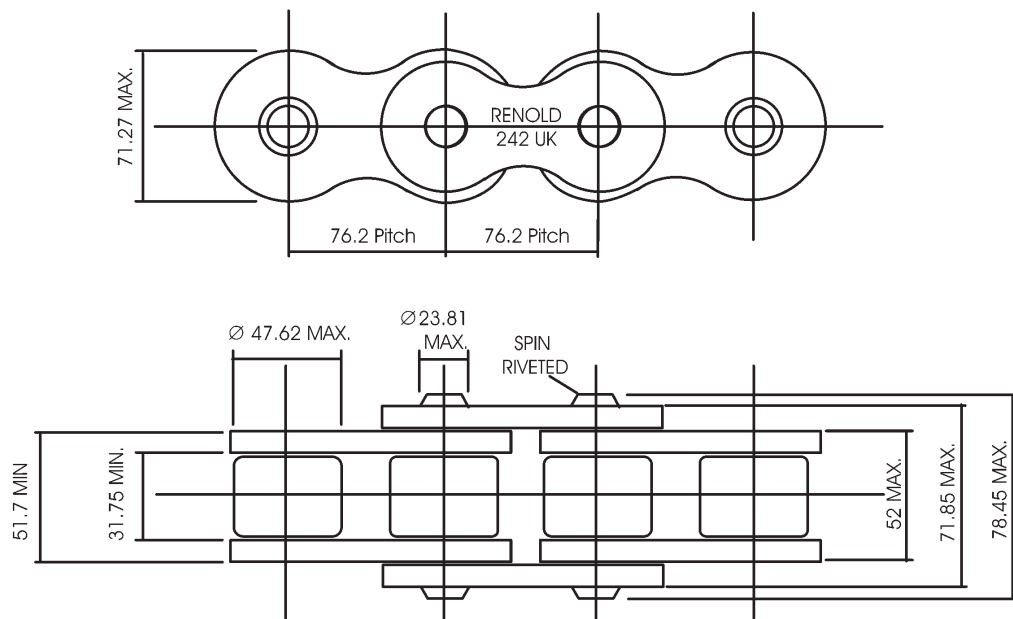
Renold 242 Drill chains

Minimum downtime - Maximum peace of mind

Renold Australia supply the 242 Drill Chains to suit the DK90 Drills in a number of sites throughout Australia.

The reputation and quality of chains is unquestionable and far superior to other brands on the market today.

The chains Renold have developed for Drill Rigs have been designed and manufactured in line with the Renold Synergy concept "improved life and greater fatigue characteristics for arduous conditions".



Breaking load - 578265N Minimum

Conveyor Chain

Value through Quality

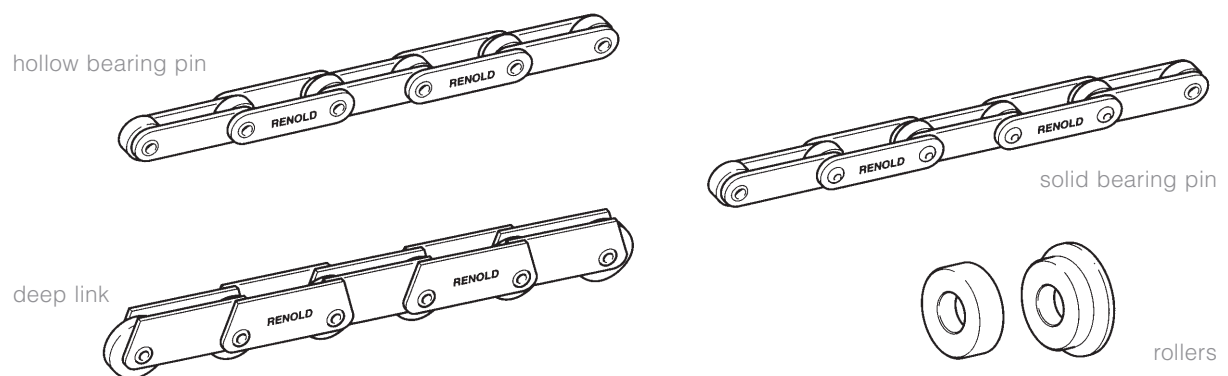
Renold Ultimate Performance

- The performance of Renold conveyor chain is ensured by a programme of continuous testing and quality control of component dimensions, fits and material properties.
- Specially formulated lubricants reduce initial wear, provide corrosion protection and long storage life.
- Breaking loads exceed the minimum international standards.
- Correct chain selection is essential for optimum performance. Renold's experienced sales, production and design staff are always available to freely advise on particular products and applications.

Renold Ultimate Reliability

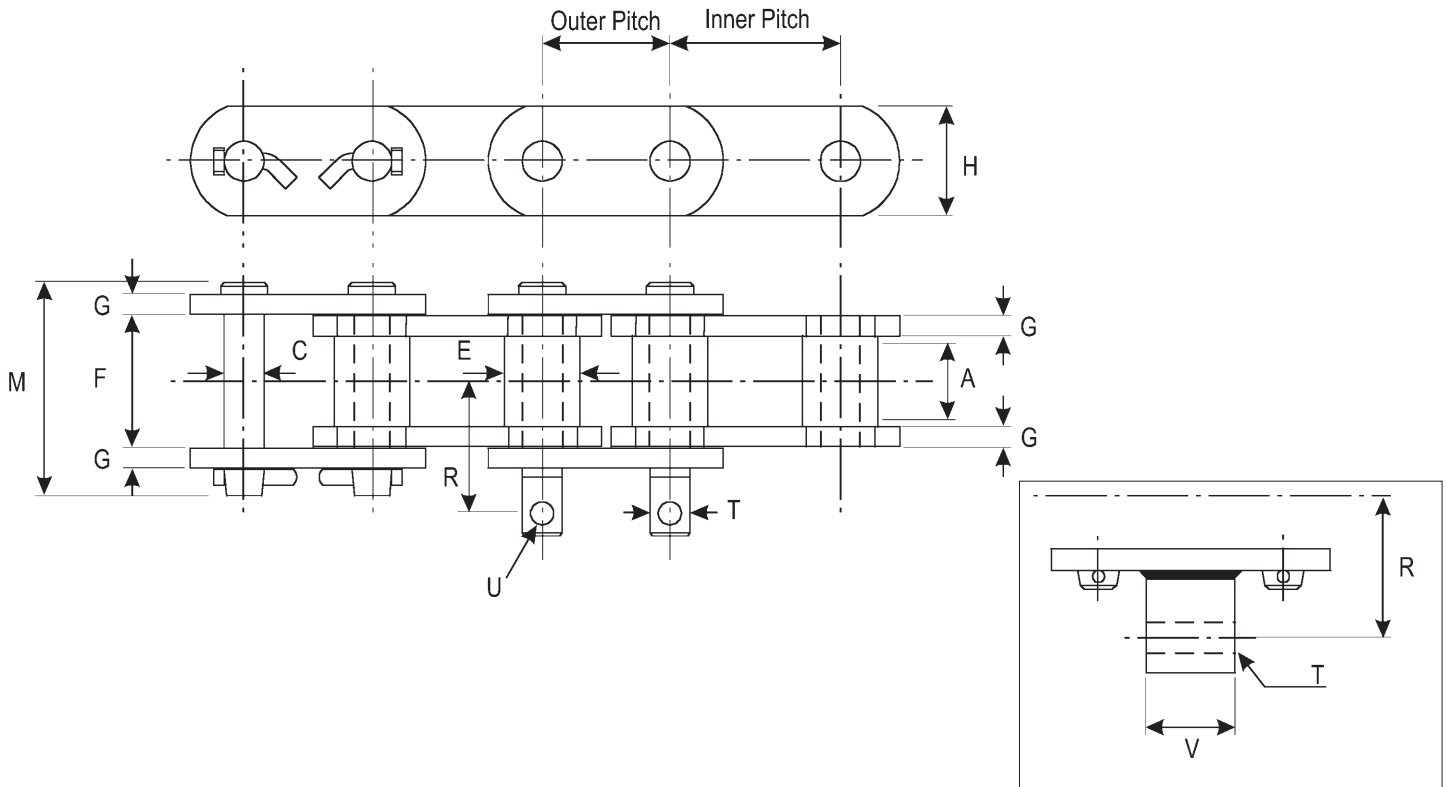
- The key to Renold chain reliability is consistency in design and manufacture.
- Minimum chain strength and resistance to wear are achieved by strict control of the material specification and by using state of the art heat treatment processes.
- Renold chain is made to the highest quality standards. All our manufacturing and assembly processes are monitored by Statistical Process Control (SPC) in conformance with ISO 9000 Quality Systems.
- The consistent overall tolerances of Renold chain make it ideal for conveying systems requiring precise alignment on multi-strand chain layouts.

Chain Types



The use of chain rollers is recommended, but bush chain (without rollers) can be used in certain applications. Rollers can be plain or flanged with a choice of size and material.

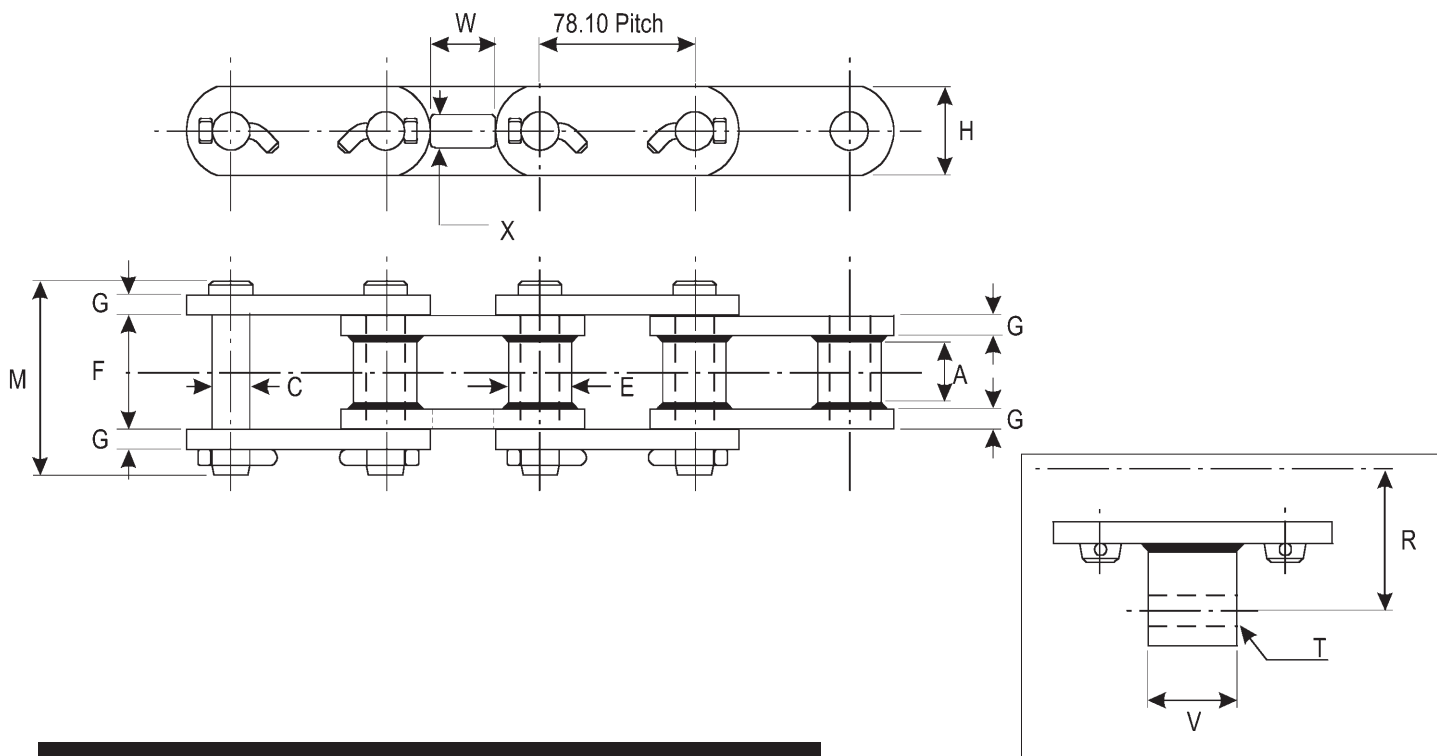
Technical Drawings & Specifications



Replaces Extended Pins

Breaker Feeder Chains (dimensions in millimetres)

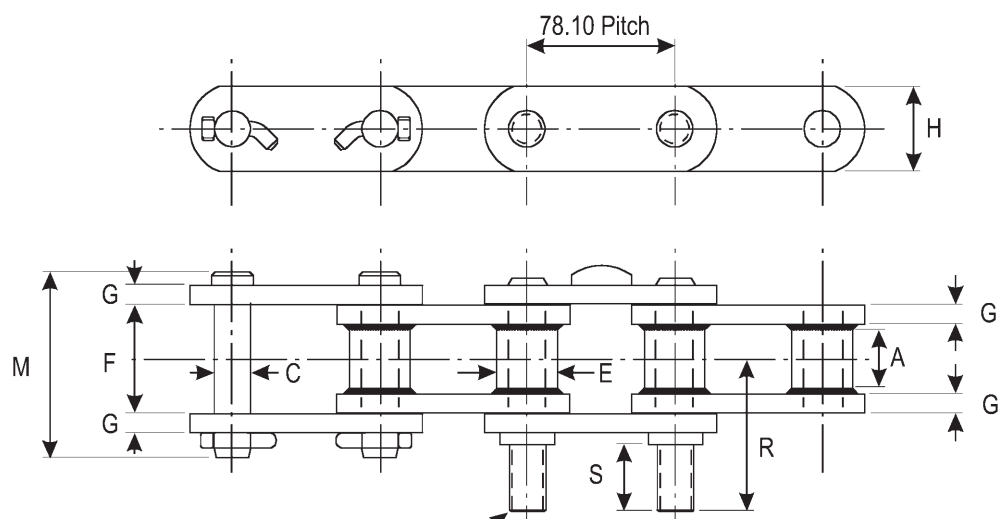
Chain Type	Pitch Outer/ Inner	Inside Width A	Pin Dia. C	Bush Dia. E	Outer Width F	Side Bar Thick G	Side Bar Height H	STD. Pin Length M	C/L to Hole Ctr. R	Pin End Dia. T1	Hole Dia. U	Attach. Width V
RC 4520-2	76.2/101.6	53	25.3	45	80	12	65	125	88.5	23.6	9.1	
RC 4565-1	76.2/101.6	50	28.3	45	85	16	75	136.5	94.5	26.3	9.1	
RC 4564-1	76.2/101.6	57	28.3	45	91	16	75	146	108.5		17	58
RC4560-1	88.9/88.9	57	28.3	45	92	12/16	75	136.5	88	26.3	9.1	
RC4560-2	88.9/88.9	57	28.3	45	91	16	75	146	92	26.3	9.1	
RC5650-1	139.7/139.7	70	34.7	56.8	113	20	100	183	137	32.8	12.7	
RC5650-2	139.7/139.7	70	34.7	56.8	113	20	100	183	146		17	75



Replaces Slotted Link

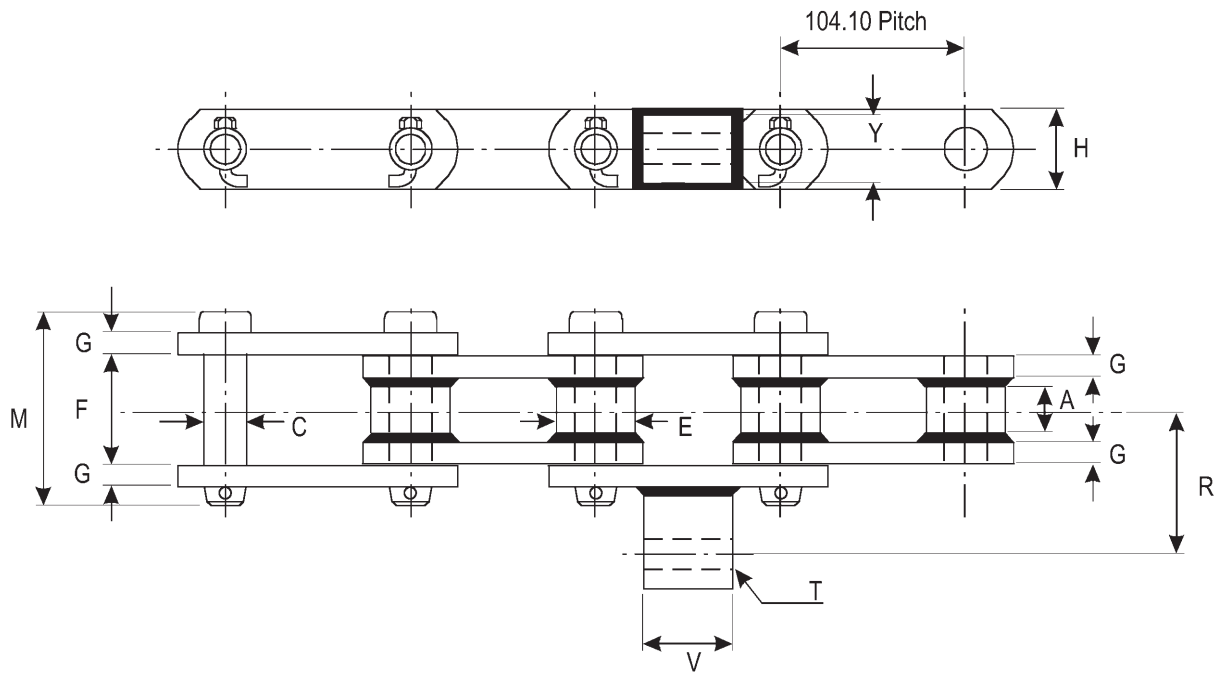
Shuttle Car Chains (dimensions in millimetres)

Chain Type	Pitch	Spkt. Width A	Pin Dia. C	Bush Dia. E	Outer Width F	Side Bar Thick G	Side Bar Height H	STD. Pin Length M	Slot Width W	Slot Height X	C/L to Hole Ctr. R	Hole Dia. T	Attach. Width V
BC 4082-1	78.1	31	19	32	58	10	45	98	32.5	17			
BC 4082-27	78.1	31	19	32	58	10	45	98			81	17	50



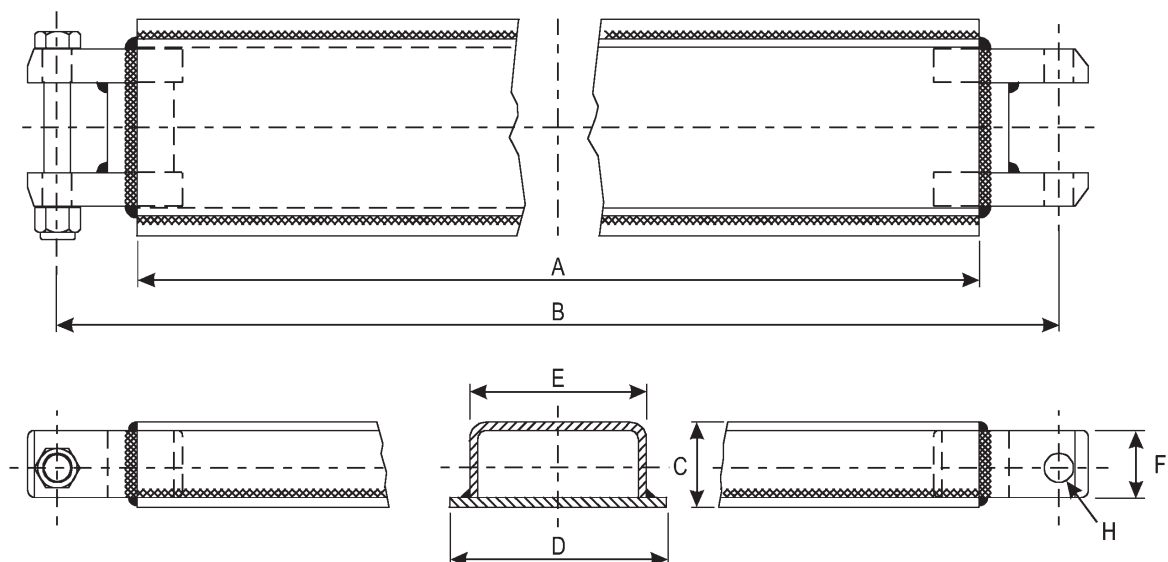
Bath Chain (dimensions in millimetres)

Chain Type	Pitch	Inside Width A	Pin Dia. C	Bush Dia. E	Outer Width F	Side Bar Thick G	Side Bar Height H	STD. Pin Length M	C/L to Pin End R	Thread Length S
BC 4332-3	78.1	31	19	32	58	10	45	98	80	35



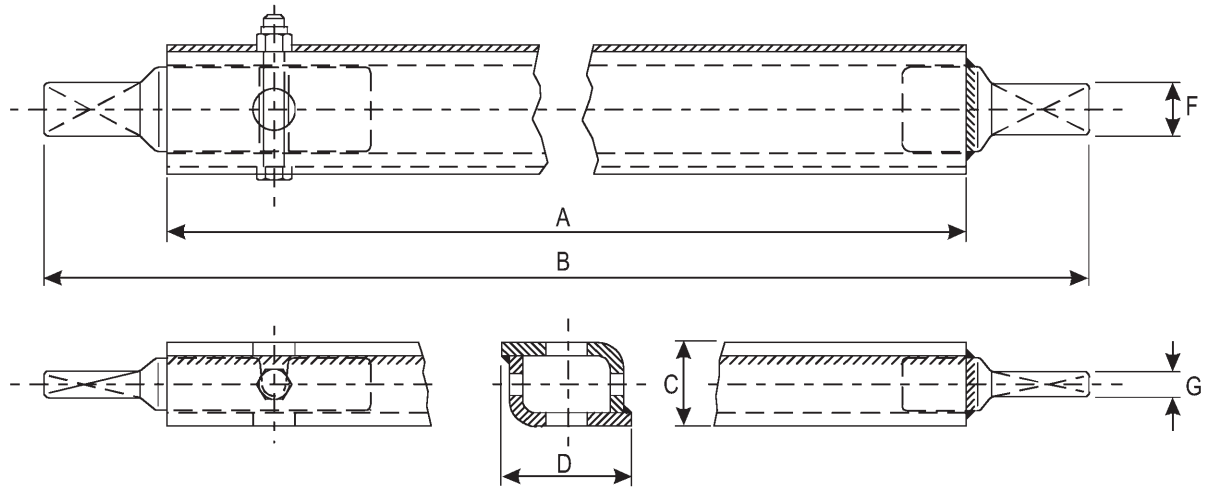
Shuttle Car Chain (dimensions in millimetres)

Chain Type	Pitch	Spkt. Width A	Pin Dia. C	Bush Dia. E	Outer Width F	Side Bar Thick G	Side Bar Height H	STD. Pin Length M	C/L to Hole Ctr. W	Hole Dia. X	Attach. Width R	T	V
BC 5454-1EH	104.1	36.5	23.8	44.5	62.5	12	45	118.5	81	17	50	17	50



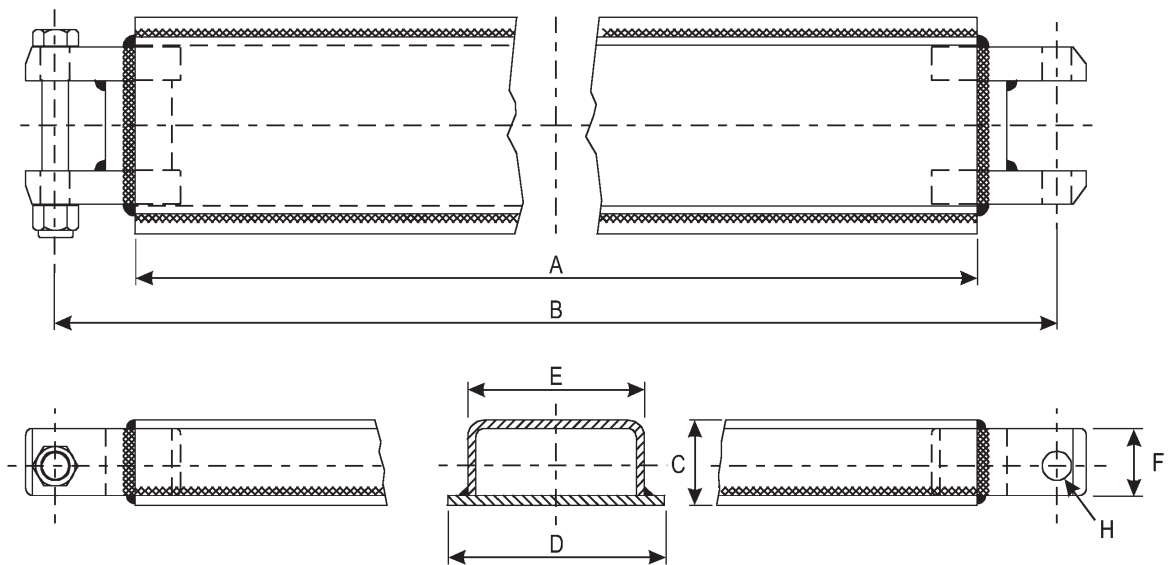
Flight Bar - Suits Block Attachment (dimensions in millimetres)

	Body Length A	O/A Length B	Bar Height C	Bar Width D	Tang Width E	Bolt Hole Dia. H
BC5454-10	807	903	48	114	106	17.5



Flight Bar - Suits Slotted Link (dimensions in millimetres)

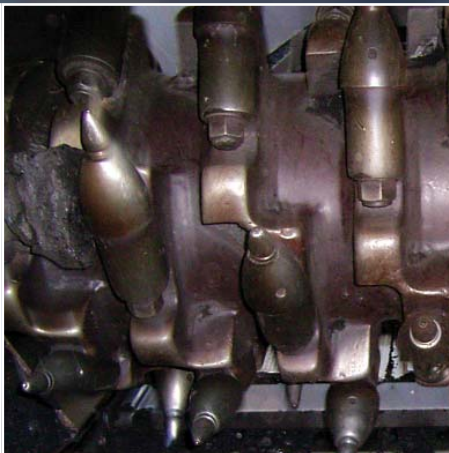
	Body Length A	O/A Length B	Bar Height C	Bar Width D	Tang Width F	Tang Thick. G
BC4082-4	995	1141	50	77	32	16
BC4082-7	794	940	50	77	32	16
BC4082-8	937	1083	50	77	32	16



Flight Bar - Suits Block Link (dimensions in millimetres)

	Body Length A	O/A Length B	Bar Height C	Bar Width D	Tang Thick. F	Bolt Hole Dia. H
BC5454-8	644	740	48	114	40	17.5

Chain Products Installation & Maintenance Manual



Chain Products Installation & Maintenance Manual

Introduction

Renold Chain has, for many years, been a leader and innovator in the design and manufacture of standard conveyor chain and the development of engineered products for such applications as escalators, travelators, sterilisers, cement conveyors, leisure rides and numerous other specialised systems for the mechanical handling industry. We have a detailed understanding of the maintenance needs on such applications and can now offer the manufacturers and operators of conveyor systems the benefits of this knowledge.

Chain is one of the most widely used moving mediums in mechanical handling systems, being robust and very adaptable, but it is also one of the most neglected components within such equipment when general or routine maintenance is carried out. In many cases this product is attended to when problems occur, normally when the chain is already damaged and the only real option is to fit a replacement to the system.

The Renold Chain Installation and Maintenance Manual has been designed with the manufacturer and operator in mind. It covers the functional aspects of using Renold conveyor chain and emphasises the correct use of preventative maintenance procedures, which will ensure better machine performance, less down time, lower overall maintenance costs and extended chain life.

Installation of New Chain

When installing a complete set of new chains the method of installation depends on the state of the conveyor, ie: if the old chain is still in place, or the chain has been removed to allow refurbishing of the sprockets, tracks etc.

Old Chain still in place

On some installations where sprocket and track wear are minimal eg: escalators, it is possible to replace the chain as the old chain is removed.

Any fixtures, slats, steps, buckets etc., which join two or more chains should be removed, except for enough to keep the chains at the correct spacing. The chains should then be broken at the tension end by removing an outer link or connecting link as necessary. Handling lengths of the new chains can then be attached to the old chains using old connecting links if possible. Care should be taken to ensure that the chains are in the correct orientation. New fixtures should be reconnected to maintain chain cross centres.

The drive can then be used to inch the new chains on and the old chains off.

When the new chains have been fed onto the conveyor the next new handling lengths can be attached, this time using new connecting links. At the same time, the old chain can be disconnected from the lower strands. Repeat until all the chain has been replaced.

No Chain in place

Where the conveyor has no chain in situ, (ie: after refurbishing tracks etc., or a new conveyor), the method of installing chain should be decided according to conveyor layout, access available and equipment available.

The following notes are intended as a guide only.

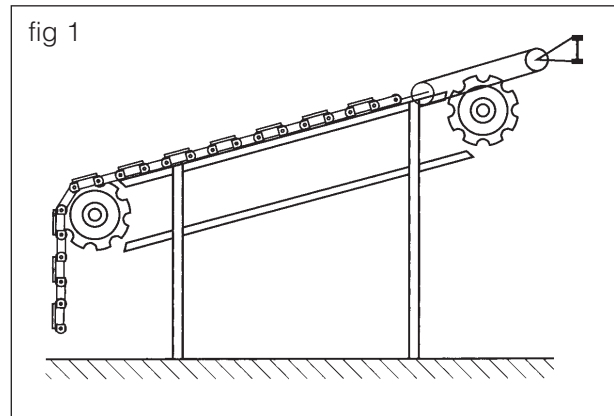
Horizontal & Inclined Conveyors

Where possible, chain should be fed on at the take-up end of the conveyor and pulled up to the drive end. When enough chain has been installed to fill up the drive, the chain can then be inched over the drive sprocket and into the return tracks.

Note: On horizontal conveyors, chain can be fed into the return tracks either over the drive or take-up wheels.

On inclined conveyors the chain will need to be hauled up using a block and tackle, 'Tirfor' or winch (fig 1). Care should be taken to make sure that the chain is always restrained and cannot run back.

On twin strand conveyors with slats/buckets etc., where access is available at the end of the conveyor, the chain handling lengths can be fully assembled with slats/buckets etc. before being installed on the conveyor and then be drawn in as complete units.



Assembly & Installation

When assembling new chain or repairing existing chain, the following precautions are necessary.

- a) All power to the conveyor should be isolated before any work is started on the chain.
- b) Care should be taken to identify the chain and to ensure that correct replacement links are at hand before breaking the chain.
- c) The chain tension should be slackened off completely so that joints are loose.
- d) The sprockets should be prevented from rotating whilst working on the chain, especially on inclined conveyors or elevators.
- e) The chain should be suitably restrained on both sides of the link to be broken, or connecting link to be removed.
- f) The correct working practices should be employed at all times.

The following points are also important and should be adhered to -

- i) The necks of connecting pins should not be ground or filed to ease insertion into the chain plates, nor should the plate holes be relieved. The press fit is an essential part of the chain construction and should not be destroyed.
- ii) Do not apply heat to the connecting plates ease insertion of the connecting pins.
This could seriously damage the material properties.

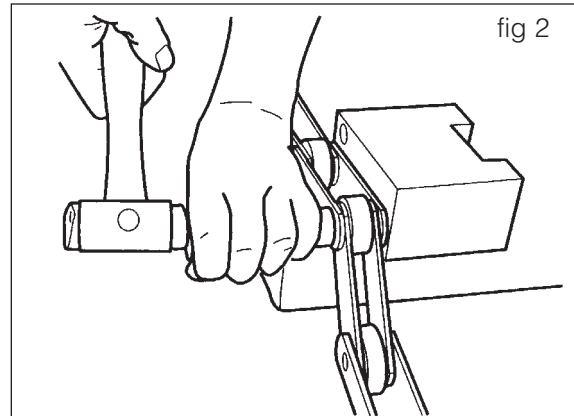
Reconnecting Chain

The method of chain connection depends upon the type of connecting link used. The main ones are either solid pin (ie: No. 107, 58, 69, 86), or hollow pin (No. 107).

Whichever type is used, the following steps are recommended -

Solid Pin Connectors

- a) Secure the chain on both sides of the assembly point.
- b) Unless the chain has to run unlubricated, coat the connecting pins with grease or oil and insert the pins into the two ends of the chain.
- c) Place the loose plate cover over the ends of the connecting pins and support the fixed plate side of the chain against the assembly force.
- d) Progressively force the loose plate onto the connecting pin necks equally and alternatively, using a hollow punch and hammer or a hydraulic press or jack. (see fig 2)
- e) When the plate is fully seated, apply the connector eg: nut, split pin or circlip, or rivet the pin end.
- f) Check that the assembled joint flexes freely.
If it is tight, a light blow on the opposite end of the connecting pins should free the joint.



Adjustment

Once the chain has been installed and all the fixtures are in place, adjustment of the chain will be necessary before the chain is run. Care must be taken that the chain is not over adjusted, as this will add pre-tension into the chain which will in turn reduce chain life.

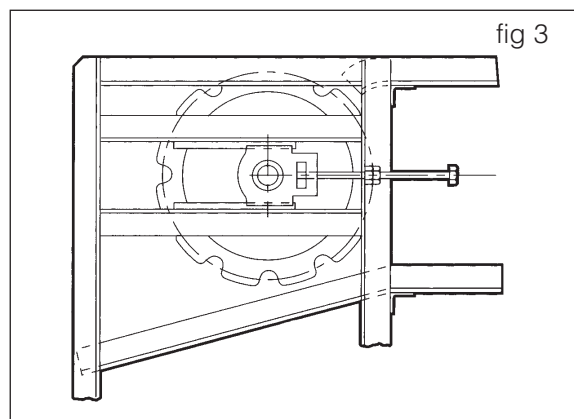
The main requirement of chain adjustment is to remove slack from the chain (ie: to take up the clearances between the pins and bushes in each link).

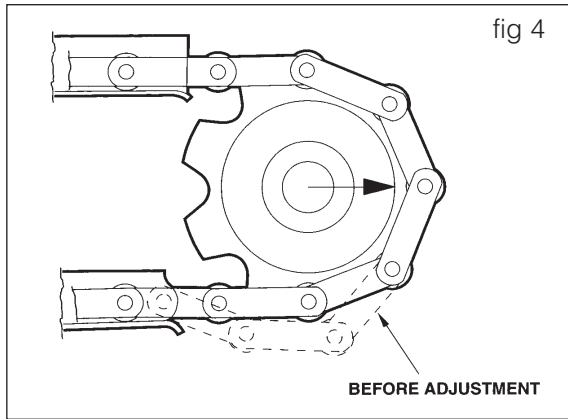
Pre-tensioning of the chain is not required.

On the majority of conveyors, a screw type take-up unit is used (see fig 3) due to its simplicity and lower cost. On this type of unit it is easy to keep on turning the adjustment screws and pre tension the chain, so great care is needed.

The following is a general guide to adjustment procedure -

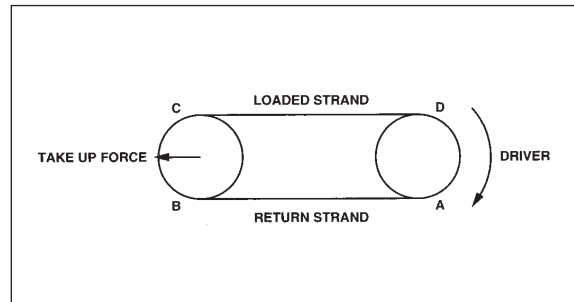
- a) Check that the tail shaft is in line ie: bearings are an equal distance back in the slides.
- b) Adjust the take up screws a few turns at a time, equally each side, until the chain no longer falls away from the bottom of the tail sprocket or drive sprocket. (see fig 4).
- c) Lock the adjusting screws.
- d) Run the conveyor for at least one complete circuit to allow the chain to settle and recheck the chain adjustment.
- e) Re-adjust if necessary.





Where an automatic take-up unit is used ie: pneumatic, hydraulic, spring etc., the amount of force exerted on the chain should be limited to prevent unnecessary pre tensioning.

An assessment of the take-up force required on a simple two strand slat conveyor can be found using the following formula.



Take-up force = (Chain pull at B + chain pull at C) + 10%.

Using this value as a guide, the actual force can be established by experiment on site.

After the chain has been adjusted and correctly lubricated, the conveyor should be left to run, if possible, for 8 to 24 hours without load to allow the chain components to bed in and bearing surfaces to polish smooth. After this period the take-up should be rechecked and adjusted if necessary.

Throughout the life of the chain the take-up should be checked on a regular maintenance schedule and re-adjusted when necessary. For maximum allowable extension, see page 15??

Maintenance Planning

To obtain the maximum performance from a set of chains and sprockets with the least amount of down time and inconvenience when replacement is necessary, the maintenance of the equipment needs to be regular and on a planned basis.

If there is no routine maintenance then the common occurrence happens, where chain on an important machine breaks or sprockets become badly worn and there are no replacements in stock and delivery time for replacements is a few weeks, the result is panic, a high cost in down time and inconvenience. By keeping a few spares in stock for important machines and with a little forethought, this can be prevented.

Performance Monitoring

The performance monitoring service offered by Renold is designed to give customers peace of mind in operating any chain system by knowing the current condition of the chain and sprockets.

Performance monitoring enables companies to monitor the wear rates of chain and plan replacements well ahead, thus avoiding expensive breakdown and down time and ensuring that replacement chains can be ordered in time to avoid delivery problems.

Performance monitoring consists of several stages -

1. On site examination - Renold engineers will visit the site and carry out in-depth examination of plant, both moving and stationary. This can determine if any serious problems of alignment, tracking, sprocket wear or eccentricity are evident and if methods of operation, maintenance or installation are likely to cause future problems.

2. Sample measurement - Samples removed on a periodic basis are stripped down to component level and measured for wear, abrasion or deformation.
3. Sample reporting - A full report of the measurement and examination is prepared by our laboratory and a copy submitted to the customer together with the Renold engineer's assessment of the chain condition and suitability for further service. The comparison is also made between current sizes and manufactured sizes.
4. Wear monitoring - Analysis of inspection reports over a period can enable customers, in conjunction with Renold engineers, to predict the effective life of a chain, providing conditions of operation do not change.

If changes are made, discussions with Renold can determine the likely effects beforehand.

Maintenance Schedule

A typical maintenance schedule is laid out below. This should be adapted to suit each specific application, based on the local conditions and duty cycle.

Typical Maintenance Schedule

Every Week

- Check lubrication and lubricate if necessary.

First Month's Running

- Check chain take-up and adjust if necessary.
- Check for unusual wear and identify cause and rectify.

Every 3 months

- Check chain take-up and adjust if necessary.
- Check for unusual wear and identify cause and rectify.

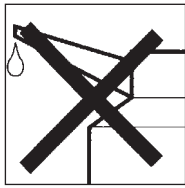
After 3 months

- Check chain adjustment and rectify if necessary.
- Change oil, oil filter and clean sump, if lubrication system fitted.

Annually

- Carry out the above checks.
- Check for wear on side plates.
- Check for chain elongation.
- Check cleanliness of components. Remove any accumulation of dirt or foreign materials.
- Check for shaft and sprocket alignment.
- Check for wear on sprockets.
- Check for condition of the lubricant.
- Check the lubrication system.

Unlubricated



Some environments preclude the use of any type of lubricant or precoating, due either to product contamination or the possibility of creating volatile compounds or grinding pastes. In these cases, chain life will be improved by periodic cleaning or washing to remove materials built up over the chain. Compressed air can sometimes be recommended should material be loose and light in mass.

Chain and Sprocket Storage

Chain

Before chain leaves the Renold factory it is pre-lubricated with a grease which acts as a corrosion protective and anti-fretting lubricant. For shipment they are either stacked on pallets and then shrink-wrapped or packed into wooden boxes. If the chain is to be stored on site for weeks or months before use, it should be left in the packaging for protection. It should not be stored in an open area where dust, dirt and water are present. If chain equipment is to be left idle for long periods, clean the chain and sprockets (ie: brushing or steam cleaning) and then cover them with oil. If chain is removed from a machine for storage, try to store it in a container filled with old engine oil or similar. Where it is not possible to store chains in a lubricated environment, they should be lubricated on installation and run unloaded for at least 24 hours.

Sprockets

Sprockets usually leave the works shrink-wrapped on pallets or in wooden boxes. All surfaces are painted before despatch except where they have been machined (ie: cut teeth or bored and keywayed). If the sprockets are not to be used within a few days of receipt, then all machined surfaces should be painted with a heavy oil or grease to prevent corrosion. As stated for the chain, do not store in an open area where dust, dirt and water are present.

General Inspection

Chain

Chain needs to be checked on a regular basis throughout its life, to ensure any faults in the machine are detected at an early stage so that rectification work can be carried out to prevent further damage.

Inspection of chain should not be left until a major breakdown has occurred. This may result in expensive replacement of major parts and long down time if the required new parts are not readily available.

On drive chain the major factor determining chain life is extension due to wear between the bearing pin and bush. However, on a conveyor chain the life may be determined by wear on other components, depending on the environment in which the chain is used. Where accessible, the chain should be checked for wear as follows -

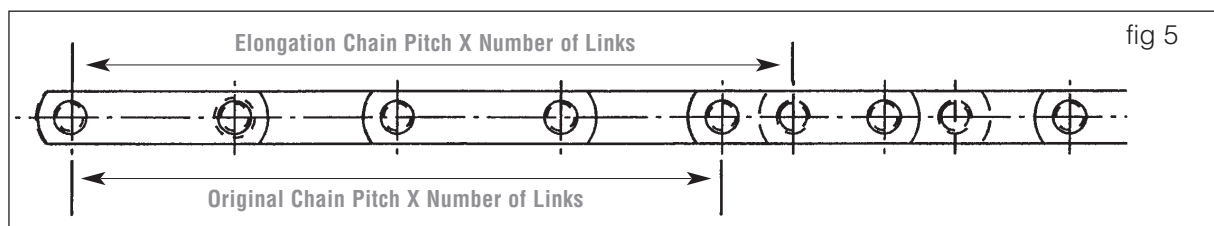
Breaker Feeder Chain

Elongation of Chain Pitch

This occurs when chain engages with sprocket or runs along the track. The flexing of the chain around the sprocket causes wear between the pin and bush thus allowing the pitch to 'stretch'. As this 'stretch' increases and the pitch becomes longer the chain tends to climb the sprocket tooth.

It is recommended that the chain be replaced when the pitch elongation approaches the maximum limit of about plus 5% of the original pitch dimension.

To check the pitch, measure at least 10 pitches under suitable tension. The elongation is calculated by comparing the original pitch when new, against the measured pitch of worn chain.



Link Plate Wear

Wear on link plates can appear in various ways, due to a number of different causes and in some cases can mean premature chain replacement.

On scraper conveyors or conveyors where the chain runs on its link plate edges, wearing away of the plate edges can occur, which will reduce the plate depth and thus the tensile strength of the chain (see fig 6).

This wear should not exceed more than half the original plate depth above the bush, otherwise a chain breakage could occur. When wear has occurred to this extent the chain should be replaced. In some cases, to extend chain life it may be possible to turn the chain over so that the unworn edge of the chain becomes the wearing surface. This will depend on the type of chain, fixtures on the chain and the make-up of the chain. (see fig 7).

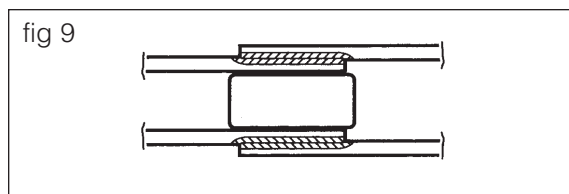
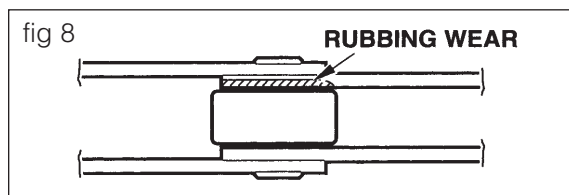
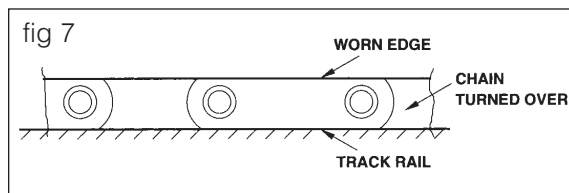
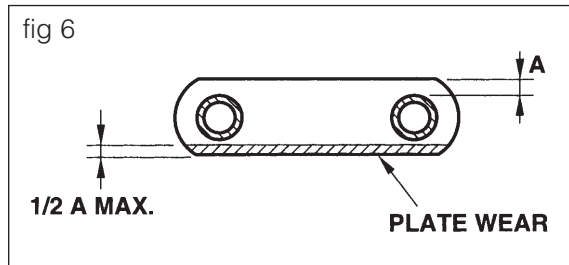
The rubbing friction between the roller side face and the inside of the inner links can produce wear on the inner link plate. If this occurs before signs of wear on other components, it is a sign of misalignment in the conveyor. In this case, roller treads should also be checked for signs of tapered wear. (see fig 8).

Similar wear may occur between the inner and outer link plates (see fig 9) (although this is not common on the BS series of chains, due to the bush projection from the inner link plates which creates a gap between the inner and outer plates.) Again, this is usually a sign of mis-alignment. In both cases, if the plate thickness has been reduced by more than 1/3 of its original thickness the chain strength is substantially reduced and the chain should be replaced after first rectifying the mis-alignments.

ie: check the following

- a) Alignment of head and tail wheels.
- b) Shaft alignments
- c) Level across tracks.

If possible, the chain should be checked for marking or damage to the inner plate edges and marking or wear on the inside faces of the inner links. This is due to the sprocket teeth rubbing on the plates as the chain engages with the sprocket. Light marking is usual, due to normal movement of chain. However, if wear is heavy and plate thickness is reducing, sprocket spacing or alignment should be checked and rectified and severely damaged links be replaced.

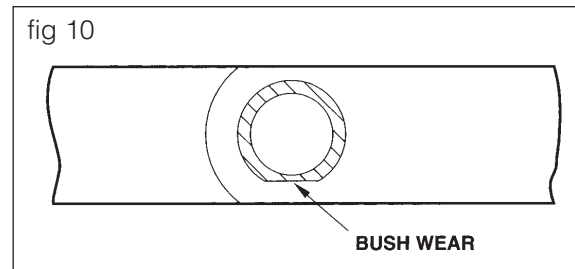


Bush Wear

Unless the conveyor uses a bush chain (ie: chain without rollers), it is not usually possible to detect bush wear or damage without dismantling a piece of chain into its component parts.

If a bush chain is used, checks should be made for wear on the outside of the bush. This wear could be due to either the bush sliding along the tracks or the bush gearing with the chain sprockets. If the bush is worn through so that the bearing pin is exposed, then the chain should be replaced. In certain circumstances it may be possible to turn the chain over and wear the opposite face of the bush to extend the chain life. (In this case, advice from Renold should be sought).

Should any cracked or broken bushes be found, then the cause should be identified and rectified, then depending on the extent of the damage, either links or the complete chain should be replaced.



Bearing Pin Wear

Normal bearing pin wear shows up as pitch extension and can be detected as stated on page 18.

Wear of the bearing pin heads can be caused by either insufficient clearance between the chain and side guides, tracks not level across the conveyor causing the chain to run over to the lower level, chain twisted due to abuse, or bad chain guidance.

The cause should be identified and rectified. If the bearing pin heads have worn down level with the chain plates, then the rivet will be ineffective and either the bad links or the complete chain should be replaced.

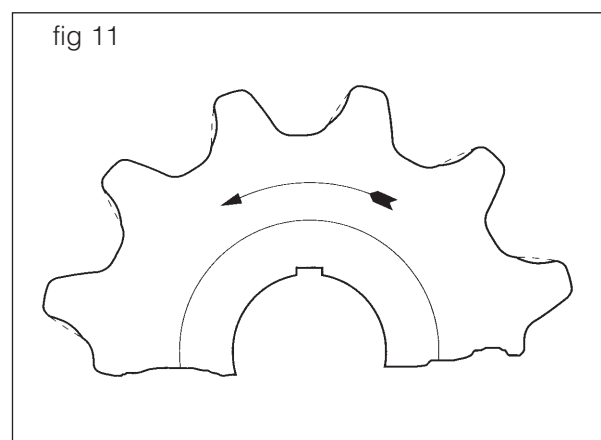
General

General visual inspection of the chain should be carried out with the foregoing to detect broken components, broken or damaged attachments, severe corrosion, seized joints or any unusual occurrences. The causes of these should be identified and rectified and damaged chain replaced.

Sprockets

Tooth Wear

Normal wear takes place due to the engagement of the chain with the sprocket teeth and shows up as a polished or worn strip on the face of the tooth gap near the root (ie: about the P.C.D.). Wear generally occurs faster on sprockets driving bush chains rather than roller chains. This is due to the sliding engagement of the bush on the tooth as opposed to the rolling engagement of the roller.



Usually as the sprocket wears, this shows up as a concavity or hooking of the tooth flank. If this is allowed to continue it will start to impede chain engagement/disengagement and on short pitch chains weakens the tooth. (see fig 11)

If the chain has not been kept in correct adjustment and runs slack it may tend to resonate and jump the teeth, causing the wear pattern shown in fig 12.

This can be rectified by correcting the chain adjustment and if necessary replacing the sprocket.

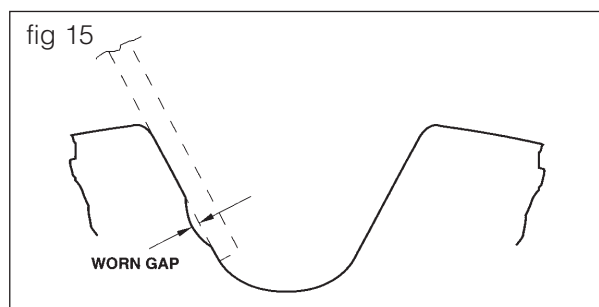
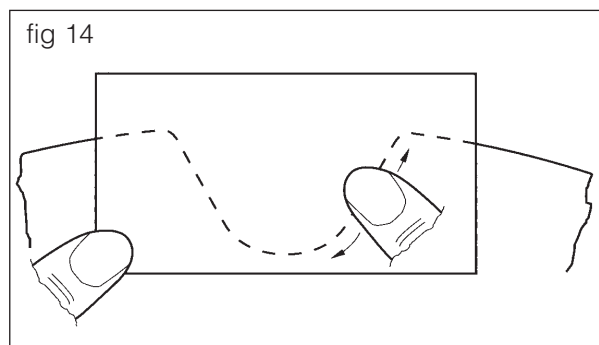
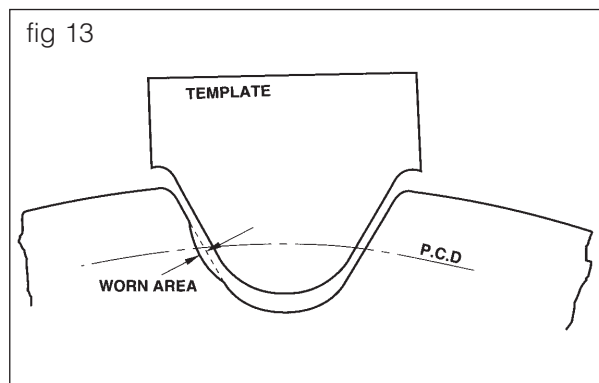
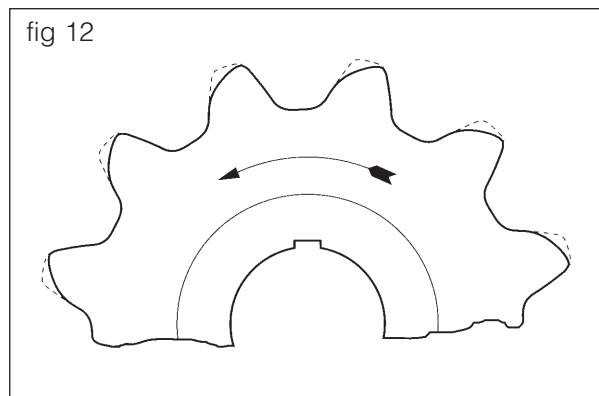
Given adequate lubrication and chain maintenance, the sprockets should last the life of the chain.

Measurement of tooth wear

Quite often it is only possible to make visual inspection of the tooth gap. However, if the sprockets are accessible during routine maintenance, then one of the following methods should be used to measure for wear.

- i) Clean the tooth gap of oil, grease or any other matter and apply to the tooth gap an "as new" template (fig 13).
- ii) Clean the tooth gap as above and apply a smear of grease around the face of the tooth gap. Hold a piece of stiff paper or card against the wheel and apply finger pressure all the way around tooth gap to form an impression on the paper/card. This can then be compared to the original tooth gap profile. (fig 14).
- iii) On larger sprockets, wear can be measured by holding a straight edge against the tooth flank and measuring the worn gap. (fig 15).

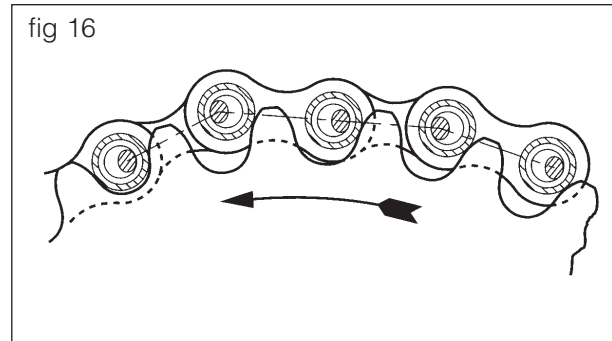
For most conveyor applications, the degree of wear should not exceed 8% to 10% of the gearing (roller or bush) diameter. In some cases, extended sprocket life can be obtained by turning the sprockets round and allowing the opposite face to wear (consult Renold for advice beforehand).



General

As a result of wear between the chain pin and bush, the distance between adjacent rollers increases more at the outer links than at the inner. In terms of sprocket engagement, this causes a greater proportion of the chain pull to be carried by the most highly loaded tooth. In the extreme the full chain pull would be carried by one tooth, with resulting accelerated tooth wear. For this reason it is bad practice to run worn chain on new sprockets and vice versa.

As well as sprocket tooth gap, checks should be made for signs of unusual wear patterns, ie: heavy wear or scoring on one side of the sprocket, tapered wear in the tooth gap, etc. These will indicate chain track, shaft or sprocket misalignments. The causes should be identified and rectified.



Alignment

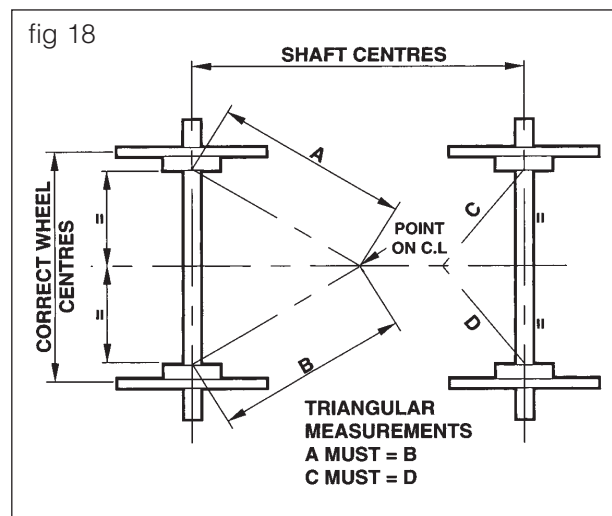
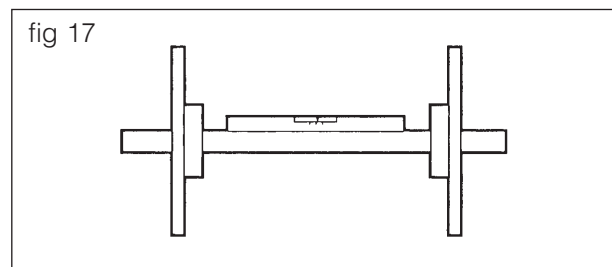
Shafts

The correct alignment of sprockets, shafts and chain tracks is essential for smooth operation of conveyors and satisfactory life of chain and sprockets.

The following checks should be carried out before a new conveyor is run, after chains and/or sprockets have been replaced, or unusual wear patterns are observed on the chain or sprockets. All shafts should be checked with a spirit level to make sure they are level. This should be within a gradient of 1/300.

Shafts should also be parallel to each other and perpendicular to the conveyor centre line. This can be checked by measuring between the shaft centres on each side of the conveyor, and also taking a triangular measurement from a point on the centre line to equidistant points on the shaft each side of the centre.

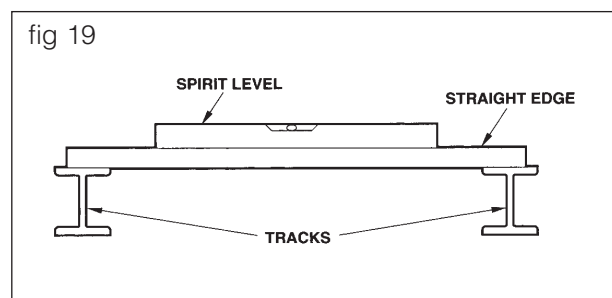
Sprockets should be set at the correct centre distance on each shaft and equidistant about the conveyor centre.



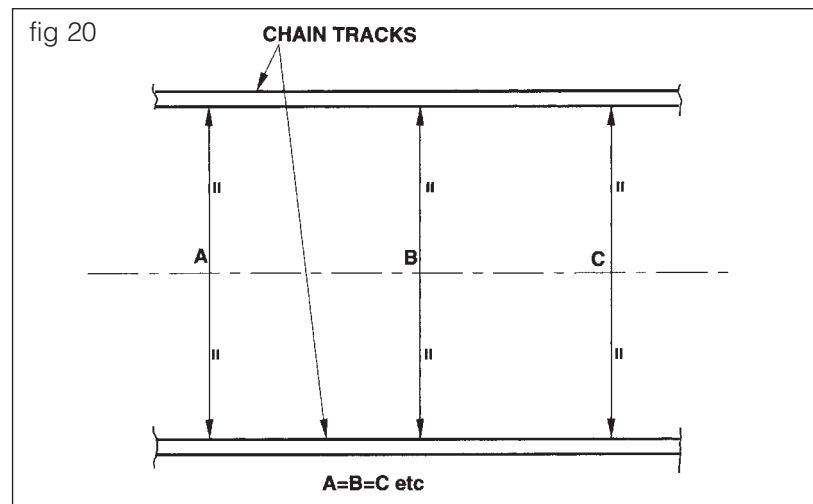
Tracks

Tracks should be checked both individually and across the set with a spirit level. This should be carried out at regular intervals along the conveyor, ie: every 1.5m to 2m.

The transverse distance between tracks should also be checked at similar distances along the conveyor, and with reference to a centre line to check for side bow.



At the ends of the conveyor, the transverse centres of the tracks and sprockets should match so that the chain has a smooth transition from one to the other.



Dismantling & Repair Chain

When it becomes necessary to replace links, sections or complete chains, the following precautions are necessary -

- a) All power to the conveyor should be isolated before any work is started on the chain.
- b) Make sure that the chain is identified and the correct replacement links are at hand before breaking the chain.
- c) The chain tension should be slackened off completely so that joints are loose.
- d) The sprockets should be prevented from rotating whilst working on the chain, especially on inclined conveyors or elevators.
- e) The chain should be suitably restrained both sides of the link to be broken, or connecting link to be removed.
- f) Make sure that the necessary safe working practices are employed at all times.

It is not recommended that the component parts of a chain be replaced individually. Repairs should be restricted to replacing complete links or lengths of chain only.

Removing a Connecting Link

Connecting links are usually of four main types.

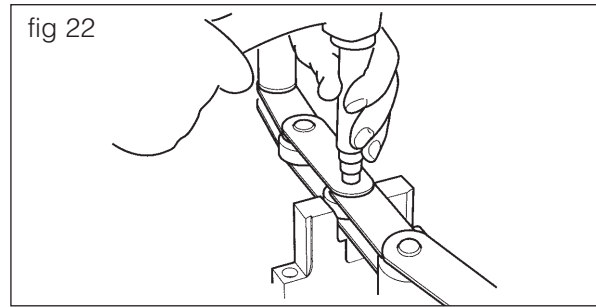
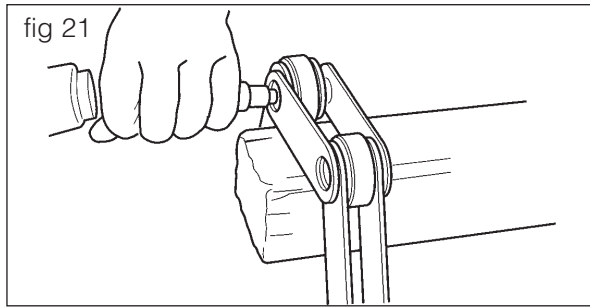
- i) Links with thread and nut fastener on one or both sides.
- ii) Links with circlip fasteners on one side.
- iii) Links with split pin fasteners on one side.
- iv) Riveting links.

To remove a connecting link, the chain should be solidly supported on the conveyor floor or on a bench and the fasteners removed from the bearing pins.

In the case of split pins, it may be necessary to cut them off flush with the O.D. of the pin.

A sharp blow with a hammer and punch against the end of each bearing pin in turn will release the pins from the link plate and allow the other plate, complete with pins, to be removed. (see fig 21 & 22).

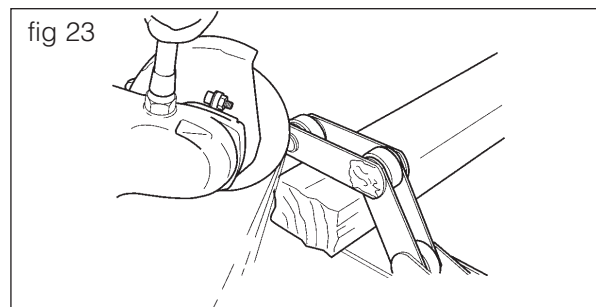
Note: if the chain is on a bench or lying on the floor, the plates should be supported.



Removing a Riveting Link

Support the chain as stated for connecting links and grind the pin heads on one side of the link, flush with the link plate. (fig 23).

To release the pins from the side plate either use a punch and hammer as previously stated, or alternatively, wedge or prise the link plate free of the pin ends. The other plate, complete with pins, can then be removed from the chain.



Note: On agricultural chains or small conveyor chains, it may be possible to use a transmission chain type chain breaker. (See our Transmission Chain Installation and Maintenance Manual).

Complete Chain Replacement

If a chain is worn out and is to be replaced entirely, then either the procedure on page 12 can be followed to remove each connecting link and thus each successive handling length, or the chain can be cut through with a torch into handleable sections for disposal.

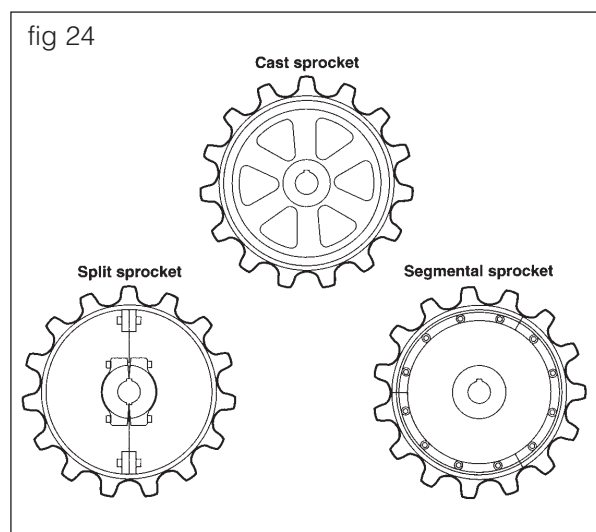
Note: When cutting the chain with a torch, the necessary safety precautions should be followed.

Sprockets

Sprockets are usually of three main types

- i) One piece sprockets of steel or cast iron.
- ii) Two piece split sprockets
- iii) Sprockets with bolt-on tooth segments

The vast majority of sprockets in use are of the one piece cast iron or fabricated steel design and are usually parallel or taper keyed to a through shaft. In this case it is necessary to remove the complete shaft to be able to remove the sprockets. If the sprockets and shaft have been in place for a number of years or the shaft is in hostile conditions, it may be more economical to replace the complete shaft assembly, rather than try to remove the sprockets from the existing shaft.



Where split sprockets are used it is not necessary to remove the shaft to be able to replace a sprocket. After removal of the chain, the sprocket can be dismantled and a new one assembled around the shaft. This type of sprocket is particularly useful on multistrand conveyors where long through shafts are used. Considerable expense can be saved in sprocket replacement time.

Sprockets with removable tooth segments are particularly useful where sprocket tooth wear is much more rapid than chain wear. With this type of sprocket, segments of teeth can be replaced one at a time without having to disconnect or remove the chain from the sprockets, thus considerable expense and downtime can be saved.

Wear strips and tracks

Wear strips and tracks have an important influence on chain performance and life, as badly aligned or badly worn wear strips can cause abnormal wear on the conveyor chain. Therefore, it is important that when replacing chain the wear strips are checked and renewed if necessary. Running new chain on worn tracks or wear strips will reduce the life of the chain.

When replacing wear strips, the following should be considered -

- i) It is desirable that the chains are slower wearing than the wear strips as they are the more critical and expensive items in the conveyor.
- ii) The wear strips should not be as hard as the chain that is running on it. Bright mild steel flats are satisfactory for most applications. However, under more arduous conditions a harder material can be used.
- iii) Wear strips should be flat and level when installed (check with spirit level). If this is not the case then chain life will be reduced and conveyor operation could be impaired. (see fig 19).
- iv) Joints in wear strips or tracks should be smooth so that no sharp edges protrude.
- v) Weld splatter, slag, metal filings, scale etc. should be eliminated from the conveyor.
- vi) Chain entry and exit points should be radiused to allow smooth transfer of chains from sprockets to tracks.
- vii) Non metallic materials such as low friction plastics can be used where chains are sliding on the chain plate edges, but should not be used where severe impact loads or abrasive conditions exist.

General

- a) New chains are usually supplied from the factory in handling lengths and coiled with one loose joining link per length, so that the lengths can be assembled into a complete endless chain.
When installing chains the notes on chain reconnection should be followed for joining and handling lengths together.
- b) If the chains have been matched, then one end of a handling length will be tagged with a strand letter and connection number (ie: A3, A4, B3, B4 etc.). Great care should be taken when assembling the chains that like ends are joined (ie: A2 to A3, B2 to B3 etc.) and also that like numbers are on opposite strands (ie: A3 opposite B3, A4 opposite B4 etc.). If short lengths are supplied to make the correct number of pitches, these are marked X and Y. The length marked X is assembled on the end of the A chains and the Y on the B chains. Do not remove the tags until the ends are joined correctly.
- c) When handling chains, great care should be taken so that the chains do not get a permanent twist or side bow. This will have an adverse affect on chain operation and life.
- d) When chains are supplied with attachments as handed strands (ie: right hand and left hand) make sure that the chains are connected in the correct orientation.
- e) Make sure that connecting links are installed with the connector on the correct side of the chain.

Troubleshooting - Conveyor Chain

Problem	Probable cause	Solution
Excessive wear in the roller bore	<ul style="list-style-type: none"> • High unit load • Twisted slats or carriers • Packing of abrasive particles • Unsatisfactory roller bore lubrication and corrosion 	<ul style="list-style-type: none"> • Distribute load - alter pitch • Rectify & check for flatness • Minimise chain/material contact - consider chain as pulling medium only • Improve lubrication; change to grease gun design if possible.
Fractured bushes	<ul style="list-style-type: none"> • Speed too high for pitch • Heavy shock load applied • Corrosion pitting 	<ul style="list-style-type: none"> • Chain of shorter pitch but equivalent strength • Investigate on-loading in attempt to minimise shock • Consider special materials or improve lubrication
Fractured plate Fractured bearing pin Elongated holes	<ul style="list-style-type: none"> • Overload above maximum breaking strength 	<ul style="list-style-type: none"> • Investigate for foreign objects causing jams • protect chain - shear pin device • review loading
Loose or damaged attachments	<ul style="list-style-type: none"> • High unit shock loading • Incorrect slat or carrier assembly • Twisted chain causing flexure of platform by continual slat or carrier movement 	<ul style="list-style-type: none"> • Minimise shock by modifying loading sequence • Re-align to ensure correct phasing of chains • Emphasis care at assembly stage in movement of handling lengths
Roller Flattening due to skidding	<ul style="list-style-type: none"> • Too lightly loaded system • Heavy load where friction between bush and roller bore overcomes lever effect of friction at roller periphery • Excessive lubricant on track • Canting of chain due to load 	<ul style="list-style-type: none"> • Increase load within limits of chain • Increase chain size if no load reduction possible • Clean and scour track • Strengthen carrying medium
Tight chain joints	<ul style="list-style-type: none"> • Material packed in chain • Material frozen in joints • Incorrect lubrication (gummy) • Corrosion • Misalignment • Plate movement after bush turning in holes 	<ul style="list-style-type: none"> • Clean and relubricate • Reduce chain/material contact. Run continuously • Clean and lubricate with correct type of lubricant • Investigate cause and consider special materials • Check alignment of structure • Improve pin/bush lubrication • Adjust correctly

Troubleshooting - Sprockets

Problem	Probable cause	Solution
Chain climbs sprockets	<ul style="list-style-type: none"> • Excessive tooth wear • Build-up of excessive slack • Chain elongation • Severe overloads • Material packing between chain and sprockets • Heavy load carried under sprocket 	<ul style="list-style-type: none"> • Replace sprockets • Adjust chain correctly • Replace chain • Reduce loading - strengthen carriers - consider special tooth form • Relieved teeth • Constrain chain around sprocket
Chain clings to sprockets	<ul style="list-style-type: none"> • Incorrect tooth form • Worn tooth form • Heavy and tacky lubricants • Stiff chain joints 	<ul style="list-style-type: none"> • Replace • Reverse sprockets • Clean and re-lubricate • See "tight chain joints"

Troubleshooting - General

Problem	Probable cause	Solution
Chain whip	<ul style="list-style-type: none"> • Excessive slack • Long centres with periodic on-loading of material causing pulsating action 	<ul style="list-style-type: none"> • Fully guide return strand
Excessive Noise	<ul style="list-style-type: none"> • Misalignment of track joints • Too little or too much slack • High Speed • Chain or sprockets worn • Ineffective lubrication • Incorrect positioning of guide tracks adjacent to sprockets 	<ul style="list-style-type: none"> • Check alignment of structure • Adjust correctly • Consider shorter pitch • Replace • Lubricate • Reposition
Uneven Running	<ul style="list-style-type: none"> • Heavy load and low speed causing rollers to "stick-slip" • Very light load and lubricant on track causing rollers to "stick-slip" • Polygonal action of closely spaced wheels in complex circuit • High friction of idler sprockets • Polygonal action on sprockets 	<ul style="list-style-type: none"> • See "Roller flattening". Consider additional drive point. Check surge at drive due to inadequate power reserve or shaft/bearing rigidity • Guides to be cleaned to remove excess lubricant and chain lubricated on round part contact points only • Increase sprocket centres or reposition sprockets • Lubricate correctly or fit low friction bearings • Introduce sprockets with larger number of teeth

Safety Warning

Health and Safety Warning

1. Always isolate the power source from the drive or equipment

2. Always wear safety glasses.

3. Always wear appropriate protective clothing, hats, gloves and safety shoes as warranted by the circumstances.

4. Always ensure tools are in good working condition and used in the proper manner.

5. Always loosen tensioning devices.

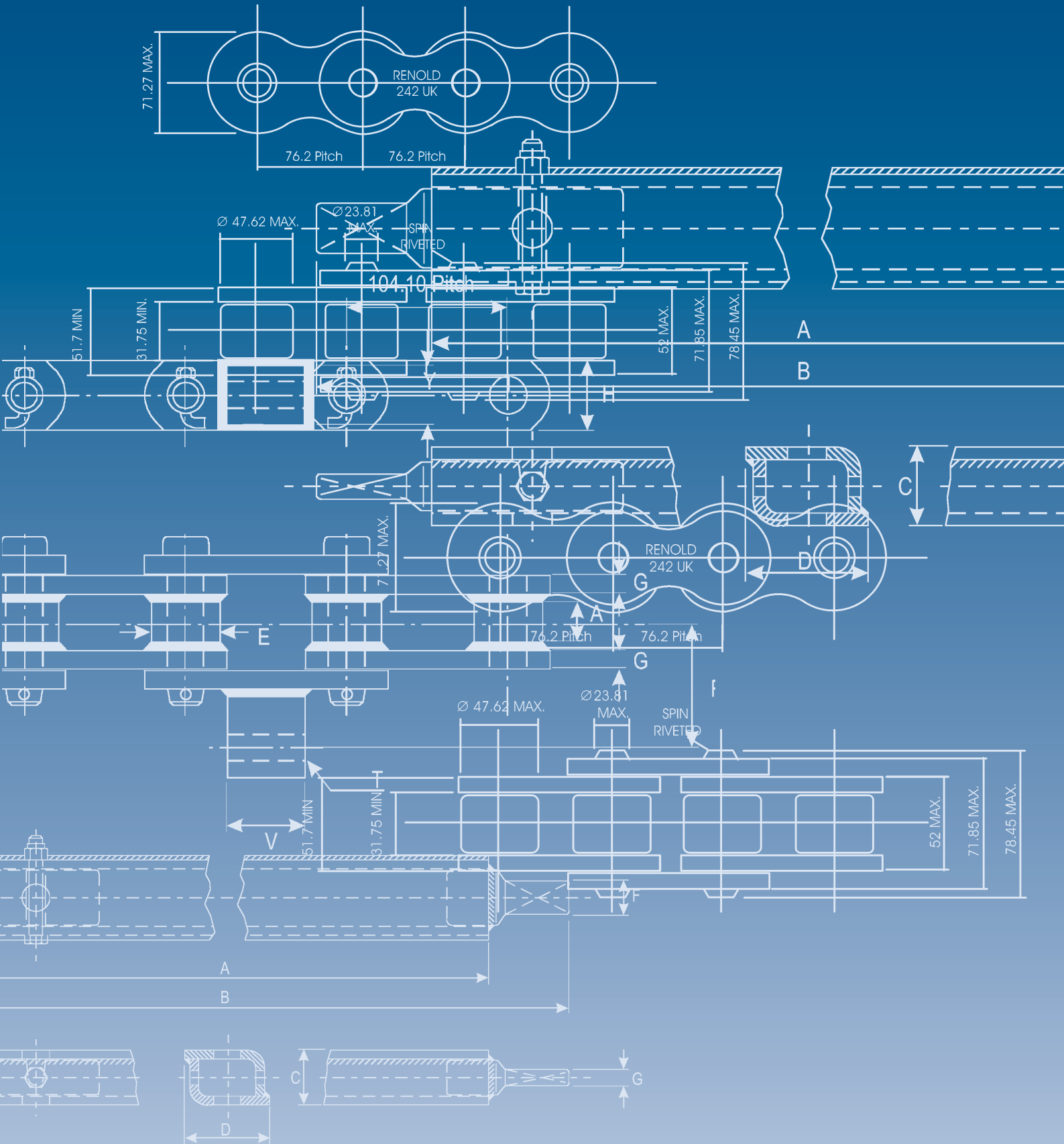
6. Always support the chain to avoid sudden unexpected movement of chain or components.

7. Never attempt to disconnect or reconnect a chain unless the chain construction is fully understood.

8. Always ensure that directions for the correct use of any tools are followed.

9. Never reuse individual components.

10. Never reuse a damaged chain or chain part.





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