




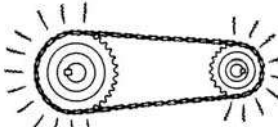

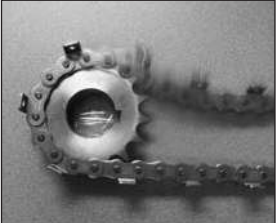
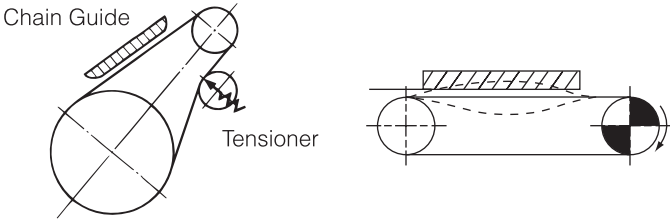


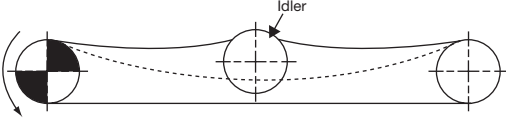
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# Roller Chain and Sprocket Troubleshooting Guide

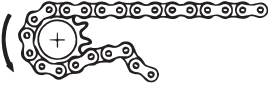
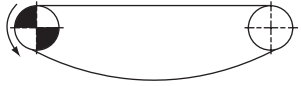
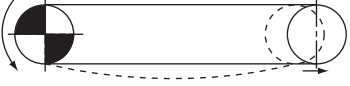










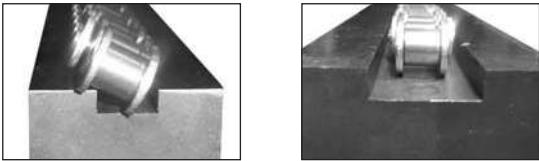


# Drive System (Roller Chain and Sprockets) Troubleshooting Guide







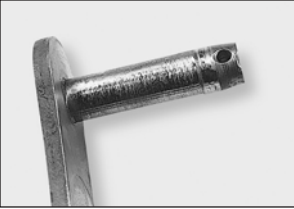

## 1. General

Problem	Possible Causes	Solution
 <p>Chain is riding up on the sprocket.</p>	<ul style="list-style-type: none"> <li>The roller chain and sprocket do not match. (eg. BS Chain on ANSI Sprockets)</li> <li>Excessive chain load.</li> <li>Elongation of the chain due to wear or excessively worn sprocket teeth.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the chain or sprocket with the correct size.</li> <li>Decrease the load, or increase the number of strands or size of the chain.</li> <li>Replace with new chain and sprockets.</li> </ul>
 <p>Unusual noises.</p>	<ul style="list-style-type: none"> <li>Improper installation of the sprocket or shaft.</li> <li>Chain casing or bearings are loose.</li> <li>Excessive or insufficient slack in the chain.</li> <li>Excessively worn chain or sprocket.</li> <li>Lack of or unsuitable lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and correct the insulation and the alignment.</li> <li>Tighten all bolts and nuts.</li> <li>Adjust the distance between shafts to obtain the proper amount of slack.</li> <li>Replace the chain and sprocket with new chain and sprocket.</li> <li>Provide proper lubrication according to the operating conditions.</li> </ul> 
 <p>Excessive vibrations in chain.</p>	<ul style="list-style-type: none"> <li>Chain is vibrating with periodic external force caused by a combination of chain tension, distance between drive / driven sprocket and the chain speed.</li> </ul>	<ol style="list-style-type: none"> <li>Prevent vibration.             <ol style="list-style-type: none"> <li>Change the natural frequency of the chain.                     <ul style="list-style-type: none"> <li>Alter the effective tension either by applying an initial tension or adjusting the existing one.</li> <li>Install a tensioner to change the chain span.</li> <li>Replace the chain with a different size or use multi-strand chain.</li> </ul> </li> <li>Change the vibration frequency.                     <ul style="list-style-type: none"> <li>Change the speed of rotation of the sprocket which results in a different chain speed.</li> <li>Re-evaluate the device set-up.</li> </ul> </li> </ol> </li> <li>Mechanically reduced the vibrations.             <ul style="list-style-type: none"> <li>Install a guide shoe.</li> <li>Install a self-adjusting tensioner on the slack side.</li> </ul> </li> </ol> 
	<ul style="list-style-type: none"> <li>Load fluctuations are excessively large.</li> </ul>	<ul style="list-style-type: none"> <li>Reduce fluctuations with fluid coupling or similar technique.</li> </ul>
 <p>The chain winds onto the sprocket (Poor separation from the sprocket teeth)</p>	<ul style="list-style-type: none"> <li>Span between shafts is too large.</li> </ul> 	<ul style="list-style-type: none"> <li>Install an idler.</li> </ul> 


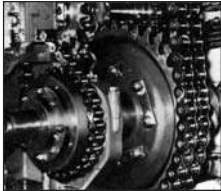



# 1. General (con't)

Problem	Possible Causes	Solution
<p>(con't)</p>  <p>The chain winds onto the sprocket (Poor separation from the sprocket teeth)</p>	<ul style="list-style-type: none"> <li>Excessive slack in chain.</li> </ul> 	<ul style="list-style-type: none"> <li>Adjust the chain length or distance between shafts. Install a tensioner.</li> </ul> 
	<ul style="list-style-type: none"> <li>Elongation of the chain due to chain wear or excessively worn sprocket teeth.</li> </ul>  <p>Old</p> 	<ul style="list-style-type: none"> <li>Replace with new chain and sprocket.</li> </ul>  <p>New</p> 
 <p>Rusting of the chain</p>	<ul style="list-style-type: none"> <li>Water condensed from the air causes rust if the metal surfaces are not properly protected with lubricant.</li> </ul>	<ul style="list-style-type: none"> <li>The primary purpose of lubrication is to reduce friction between contacting surfaces. While friction can't be completely eliminated, it can be reduced to negligible or acceptable levels. Lubrication is also used to reduce oxidation and prevent rust; and to seal against dust, dirt and water. Adding a casing around the chain will also help to protect it from dust, dirt and water.</li> </ul> 
 <p>Excessive wear on the inside surface of the link plates and sides of the sprocket teeth.</p> 	<ul style="list-style-type: none"> <li>Improper installation of chain and sprocket. (eg. misalignment)</li> </ul>	<ul style="list-style-type: none"> <li>Correct sprocket and shaft installation.</li> </ul>  <p style="text-align: center;"><b>X</b>                      <b>X</b>                      ✓</p>
<p>Excessive wear on the link plate side surfaces and pin heads.</p>	<p>Improper installation of guides, etc.</p> 	<ul style="list-style-type: none"> <li>Check the condition of the guides, and increase the gap between the guides and the chain.</li> </ul>  <p style="text-align: center;"><b>X</b>                      ✓</p>

## 1. General (con't)

Problem	Possible Causes	Solution
 <p>Improper flex or bending of chain, tight joints.</p>	<ul style="list-style-type: none"> <li>Chain is not installed correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect the installation and correct as necessary.</li> </ul>
	<ul style="list-style-type: none"> <li>Contamination from metal dust or dirt because of improper lubrication.</li> </ul> 	<ul style="list-style-type: none"> <li>Remove the chain, wash it thoroughly, and provide proper lubrication.</li> </ul> 
	<ul style="list-style-type: none"> <li>Excessive load or bent pin.</li> </ul> 	<ul style="list-style-type: none"> <li>Reduce the load or increase the number of or size of chains.</li> <li>Replace chain with a larger size.</li> </ul>
	<ul style="list-style-type: none"> <li>Corrosion or rusting.</li> </ul> 	<ul style="list-style-type: none"> <li>Install a chain casing to protect the chain.</li> <li>Replace with anti-corrosive chain such as stainless steel or WP chain.</li> </ul>
	<ul style="list-style-type: none"> <li>Seizing from improper lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>Provide proper lubrication according to the operating conditions.</li> </ul> 
	<ul style="list-style-type: none"> <li>Seizing of pin and bushing.</li> </ul>  <p>Pin and bushing seized from high-speed operation. This causes improper bending and can lead to chain breakage.</p>	<ul style="list-style-type: none"> <li>Provide the proper operating conditions such as chain speed, lubrication, chain load, etc.</li> </ul>
<p>Spreading of link plates.</p>	<ul style="list-style-type: none"> <li>Uneven or excessive loading caused by improper installation.</li> </ul> 	<ul style="list-style-type: none"> <li>Replace with new chain and correct installation.</li> </ul>

## 2. Link Plate Related

Problem	Possible Causes	Solution
Breakage of link plate.	<ul style="list-style-type: none"> <li>Excessively large shock load.</li> </ul>	<ul style="list-style-type: none"> <li>Reduce shock loads by making the start-up, stopping, and other actions smoother (installing a shock absorber, etc.).</li> <li>Increase size or number of chains or select a heavy duty "HT" chain.</li> </ul> 
	<ul style="list-style-type: none"> <li>Vibrations in the chain.</li> </ul>	<ul style="list-style-type: none"> <li>Install an anti-vibration device (for example, tensioner or idler).</li> <li>Refer to "Excessive vibration in chain" page (found earlier in this section).</li> </ul>
	<ul style="list-style-type: none"> <li>Large inertia in the driven machine (excessive load).</li> </ul>	<ul style="list-style-type: none"> <li>Increase size or number of chains or select a Super Series chain.</li> </ul>   <p data-bbox="922 926 1105 951">Multiple Strand Chain</p> <p data-bbox="1284 926 1451 951">Super Series Chain</p>
	<ul style="list-style-type: none"> <li>Corrosion.</li> </ul> 	<ul style="list-style-type: none"> <li>Periodically clean the chain.</li> <li>Install a casing to protect the chain.</li> <li>Replace with a corrosion resistant chain (see photo).</li> </ul> 



(1) Static fracture.  
Stretching the link plate with a tensile load beyond its breaking load will cause it to stretch and then break.



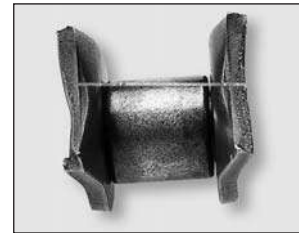
HT Chain or Size Up



(2) Fatigue fracture.  
By repeatedly applying a load past its fatigue limit (fatigue strength), the fracture will start at the holes and then will spread until the part breaks.









Super Series or Super H Chain (or choose a chain one size up)






(3) Offset link plate fatigue.  
Offset link plates are bent at the center, and the resulting concentration of stress at the bend can cause a fatigue break. Avoid using offset links in high-stress applications.


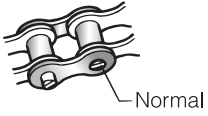

## 2. Link Plate Related (con't)

Problem	Possible Causes	Solution
 <p>Cracks in the link plates (fatigue), which are perpendicular to the direction of pull.</p>	<ul style="list-style-type: none"> <li>• Loads are greater than the maximum allowable load. And this excessive load is repeating.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove all large loads. If it is not possible to remove the excess load, then increase the size or number of chains.</li> <li>• Replace with a Super Series or Super-H chain.</li> </ul> 
 <p>Deformation of link plate holes.</p>	<ul style="list-style-type: none"> <li>• Excessive load.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove excessive load.</li> <li>• Replace with a HT or Super-H chain.</li> </ul> 
 <p>Corrosion stress cracks appear, usually as bow-shaped cracks in the link plate.</p>	<ul style="list-style-type: none"> <li>• The chain is being used in corrosive (acidic or alkaline) conditions. (This is not caused by a repetitive load).</li> </ul>	<ul style="list-style-type: none"> <li>• Replace with a new chain.</li> <li>• Install a casing to protect the chain from the corrosive conditions.</li> <li>• Or use stainless steel chain.</li> </ul> 




## 3. Pin Related

Problem	Possible Causes	Solution
Breakage of pin.	<ul style="list-style-type: none"> <li>• Excessively large shock loads.</li> </ul> 	<ul style="list-style-type: none"> <li>• Reduce shock loads by making the start-up, stopping, and other actions smoother.</li> </ul>
	<ul style="list-style-type: none"> <li>• Subject to a repetitive load greater than the fatigue limit of the pin.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove the large repetitive load or increase the size or number of chains.</li> </ul>
	<ul style="list-style-type: none"> <li>• Corrosion.</li> </ul>	<ul style="list-style-type: none"> <li>• Install a casing to protect the chain.</li> <li>• Periodically clean and lubricate the chains.</li> </ul>
	<p>(1) Static fracture. The type of fracture found when subjecting the chain to the breakage test. Occurs when chain is subjected to a load greater than its breakage strength.</p> 	<p>(2) Fatigue fracture. Occurs when the pin is repetitively subjected to loads greater than its fatigue limit. Re-check the size of the peak load and formulate a counter-measure.</p> 

### 3. Pin Related (con't)

Problem	Possible Causes	Solution
   Normal Pin rotates or begins to stick out.	<ul style="list-style-type: none"> <li>Excessive load or improper lubrication.</li> <li>Operating a chain at high load without proper lubrication can create friction between the pin and bushing, causing the pin to rotate. In this condition, the pin may come out, leading to chain breakage.</li> </ul>	<ul style="list-style-type: none"> <li>Replace with new chain. Improve the lubrication or loading conditions.</li> <li>Replace with new chain immediately. Do not weld or reuse the pins. If the pin head or link plate surface is worn, check the installation. Also insure that the chain is properly lubricated.</li> </ul>  Welding is not recommended
Wear or rust occurs only at the connecting pin in a lifting application or similar operation.	<ul style="list-style-type: none"> <li>Improper initial lubrication at installation.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the connecting link. If pin wear is excessive, also replace the chain. Properly install the connecting section for devices such as end brackets used for lifting applications, etc.</li> <li>Also use lubrication and tight fit cover plate on connecting link.</li> </ul>

### 4. Bushing / Roller Related

Problem	Possible Causes	Solution
 Roller and/or bushing splits.	<ul style="list-style-type: none"> <li>Excessive load or speed of rotation.</li> <li>Inadequate lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>Choose a different chain according to the horsepower ratings table.</li> <li>Replace the chain. Provide adequate lubrication according to the operating conditions.</li> </ul>
	Fatigue fracture. The chain reached the point of fatigue during operation and eventually broke. This could also have been caused by impact with the sprocket teeth at a force exceeding the chain's transmission capacity.	
Roller does not rotate.	<ul style="list-style-type: none"> <li>RS11SS, RS15, RS25, RS35 (bushed chain)</li> <li>The inner link plate is moving inward, or the bushing is cracked.</li> <li>Foreign particles have gotten between the bushing and roller.</li> </ul>	<ul style="list-style-type: none"> <li>Use a roller chain instead of a bushed chain.</li> <li>Replace with a new chain. Re-inspect the installation and load conditions.</li> <li>Periodically clean the chain.</li> <li>Install a cover to protect the chain.</li> </ul>
Roller is opening up.	<ul style="list-style-type: none"> <li>Excessive load.</li> </ul> 	<ul style="list-style-type: none"> <li>Reduce the load.</li> <li>Provide adequate lubrication.</li> </ul>
Roller is becoming hourglass shaped.	<ul style="list-style-type: none"> <li>Excessive load or inadequate lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>Replace with new chain. Improve the lubrication or loading conditions.</li> </ul>