



Material Handling Solutions



Are your chains healthy?

Roller chain drives are one of the primary systems used in the industry to convey products. Chains are the workhorse in the majority of PFlow Industries' VRCs.

The roller chain design that PFlow Industries has chosen for our mechanical VRCs reduces friction, resulting in higher efficiency and less wear. PFlow takes great care to properly size the chain needed for your application, whether it is a 1,000 lb lifting capacity in a food service processing facility, or a 5,000 lb lifting capacity in a manufacturing facility.

The life of a roller chain depends on a variety of factors:

- Product load
- Correct chain tensioning
- Frequency of use
- Proper lubrication

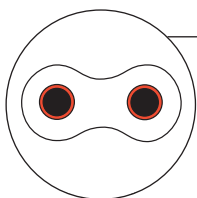


Chain wear

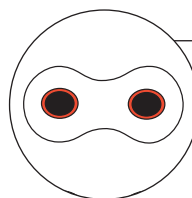
Roller chains don't actually stretch like a piece of leather. As material is worn away from the surfaces the roller chain will gradually elongate. What actually happens is the holes that contain the chain's pins elongate over time (changes shape from a circle to an oval), the spacing of the links is increased and the cumulative effect makes the chain longer in length. Note that this is due to wear at the pivoting pins and bushings, not from actual stretching of the metal.

Elongation due to wear is normal during VRC operation, but over time, will begin to wear out other components.

Roller chain that suffers from elongation ("stretch") due to wear does hamper productivity and increases the cost of the operation. It is unusual for a chain to wear until it breaks, since a worn chain leads to the rapid onset of wear on the teeth of the sprockets, with ultimate failure being the loss of all the teeth on the sprocket. The sprockets suffer a grinding motion that puts a characteristic hook shape into the driven face of the teeth. This effect is made worse by a chain improperly tensioned. The worn teeth (and chain) no longer provides smooth movement and this may become evident from the onset of noise or vibration. Both sprockets and chain should be replaced in these cases, since a new chain on worn sprockets will not last long.



Good chain



Worn chain - elongated pivoting pins and bushings.

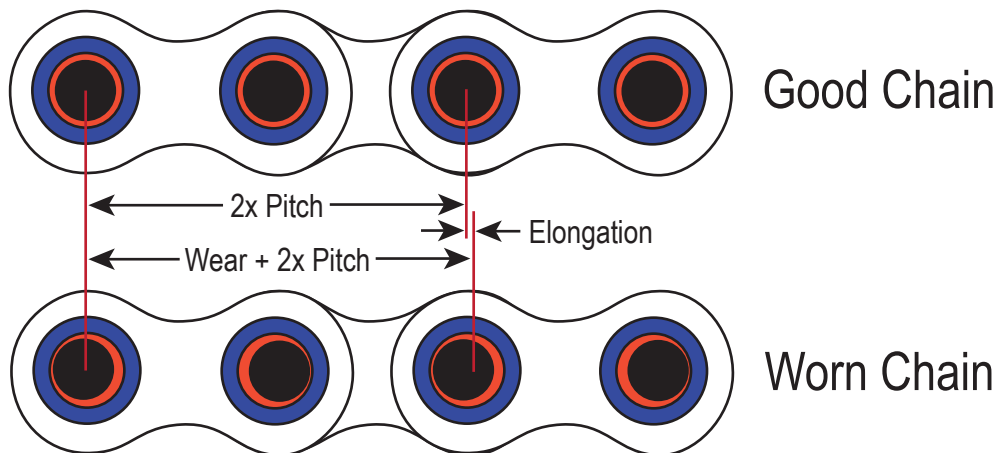
Wear elongation measurement

Using a chain wear gauge enables you to track chain wear at each service inspection and to correct any problems before additional components are damaged. Wear measurements can be made to determine if the chain has elongated to a length where replacement is necessary. To ensure accurate results, length measurements on roller chain must be done when the chain is in tension. If the chain is measured while still on the sprockets, the system must be turned off and all safety procedures must be followed. The tight span of the chain is the section that should be measured. If the chain has been removed from the sprockets, the ANSI specified measuring load should be applied to the chain so that the slack has been removed.

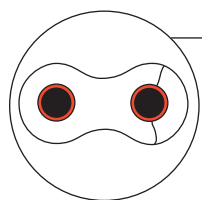
Measure as closely as possible from the center of pin to the center of another. The more links contained within the measurement increase the accuracy. If the measured value exceeds the nominal by more than the allowable

percentage the chain should be replaced. The maximum allowable wear elongation is approximately 3% for most industrial applications, based upon sprocket design. The allowable chain wear in percent for large sprockets with 68 teeth or greater can be calculated using the relationship: $200/N$, where N is the number of teeth in the large sprocket. This relationship is often useful since the normal maximum allowable chain wear elongation of 3% is valid only up to 67 teeth in the large sprocket. In drives having fixed center distances, chains running in parallel or where smoother operation is required, wear should be limited to approximately 1.5%.

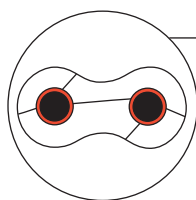
Example: if 12 pitches (12 pins) of a #80 chain were measured and result was 12.360" or greater (using 3% as the maximum allowable wear), the chain should be replaced. Anything less than 12.360" would still be acceptable by most industrial standards.



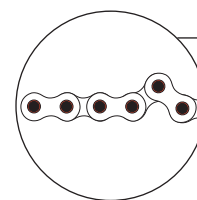
Other signs of chain wear



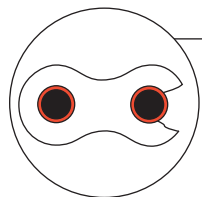
Cracked plate.
 Cause: Loading beyond the chain's capacity.



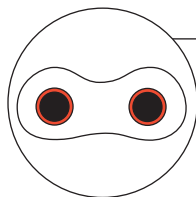
Arc like cracked plate.
 Cause: Severe rusting or exposure to caustic medium.



Tight joints.
 Cause: Dirt or foreign substance in packed joints.



Fractured plate.
 Cause: High overload.



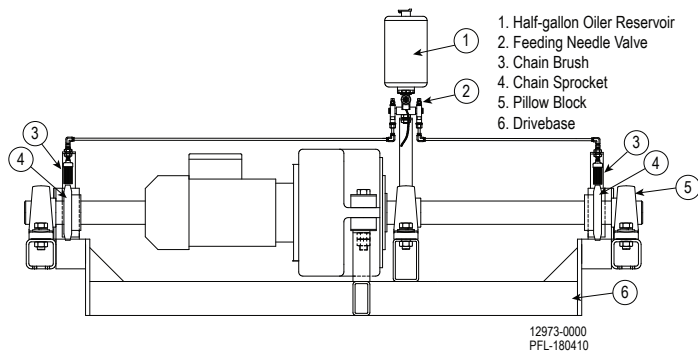
Worn contour.
 Cause: Abnormal wear rubbing on the guides.

Automate the Maintenance Process

Regardless of whether the application of the chain oil is accomplished manually or by use of an automatic system, the oil needs to be aimed into the pin and bushing area. Automating the process provides a reliable and economical means of reducing down time. PFlow Industries, Inc. offers two different automatic maintenance systems.



Air-Operated Oiling System This optional system features a number of pumps with a 3-way air solenoid, easy-to-fill polycarbonate reservoir, and programmable cycle timer. The oiler components are housed in a compact hinged-door enclosure that can be mounted at an easy-to-access height. The external half-gallon reservoir allows visual observation of the liquid level and the fill cap at the top of the reservoir makes any refill a snap. Precise volumetric delivery results in the delivery of an exact amount of oil with no “after drip” concerns. Contact PFlow Industries, Inc. Product Support Department for more information.



Gravity-based Oiling System Located at the top of the VRC, drop feeding of the liquid oil is powered by solenoid valves. The flow rate of the liquid supply is adjusted at each of the feeding needle valves located just below the reservoir. Brushes mounted just above the chains spread the oil across the width of the chains. Power to the solenoid valves must be turned off manually with the flip of a switch. Contact PFlow Industries, Inc. Product Support Department for more information.

Note: Pricing varies depending on the configuration of original equipment as purchased and modifications required.

Applying Oil to the Chains

The importance of proper maintenance of the roller chain during operation can not be overstated. There are many chains that have to operate in dirty conditions. These chains will have high rates of wear, particularly when maintenance is neglected. The operators are willing to accept more friction, less efficiency, more noise, and more frequent replacement.

The current chain maintenance practice consists of applying a heavy oil or grease to the outside of the chain. While this covers the sprockets and the outside of the chain, it does little to protect the most vulnerable area of the chain: the contacting surfaces inside the pin and bushing/ plate/ roller/ hook.

The majority of chains fail from the inside. They stretch or kink due to wear and corrosion inside the pin and bushing area. To add oil to the chains properly, the oil needs to reach the inside of the chain (to remove contaminants and displace any trapped water that it encounters) and leave behind a heavy layer of oil or grease.



Regardless of whether the maintenance is accomplished manually or by use of an automatic system, the oil needs to be aimed into the pin and bushing area.

To reach all of these surfaces, the lubricant should be applied to the upper edges of the link plates on the lower strand of the chain shortly before the chain engages a sprocket. Then, as the chain travels around the sprocket, the lubricant is carried by centrifugal force into the clearances between the pins and the bushings. Spillage over the link plates supplies lubricant to the interior and the end surfaces of the rollers.

Tailoring the lubricant to the specific operating environment is helpful. Chains operating in a dusty environment benefit from a product that is a combination of penetrating oil and lubricant. ***PFlow Industries, Inc. offers Fluid Film® aerosol, a lanolin-based brand of corrosion preventive and lubricant. This provides corrosion control, penetration, metal wetting and water displacement. [Part number 13061-0000]***

In a humid environment (such as a pulp mill), or where chains are subject to water wash-down (such as food plants), it is imperative to displace water from the chain on a regular basis by using a penetrating type of chain lubricant.

If the chain is running through and/or is immersed in water, a combination of penetrating oil and tacky grease is the best method. This forces the water out initially, and then seals the inside of the chain to prevent water from getting in.



Irving Pulp and Paper Mill
 Photo courtesy of Dave MacGowan Sr

* This information was found on www.machinerylubrication.com