

# Chain Selection Criteria



## Guide Lines

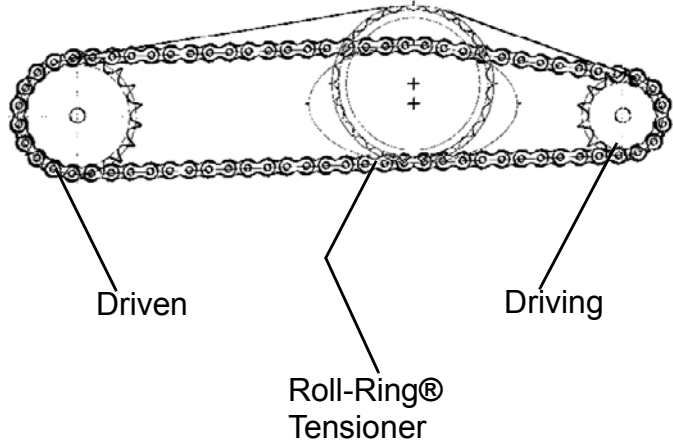
Information needed for proper chain selection:

- Define Load-Uniform, moderate or heavy shock.
- Horse power to be transmitted.
- Full-load speed of the driving shaft.
- Desired speed of the driven shaft.
- Center distance between shafts adjustment possible.
- Lubrication available.
- Limits on space and position of drive, horizontal, vertical.
- Other conditions such as, type of environment (corrosive), use of idlers, temperatures and wide variations in load and speed, etc.

## Selection and Installation

- Speed ratios (Driven : Driver Sprocket) should not exceed 7:1 under normal operating conditions.
- At low speed the smaller driving sprocket can usually operate effectively with 12 to 17 teeth.
- For higher speeds select the smallest pitch chain that will operate effectively under the application load. Also the smaller sprocket should have at least 25 teeth to avoid problems that occur when a chain moving rapidly in a straight line has to suddenly wrap around a small diameter sprocket.
- Chain wrap on the small sprocket must be at least 120°.
- The distance between shafts should be 30 to 50 times the pitch of the chain. When the load is pulsating, the distance of the shafts can be reduced to just 20 times the pitch of the chain.
- Shafts should be parallel and level. The sprockets should be in proper alignment and the chain spans should not touch.
- Chain length should be in even numbers of links. An uneven number of links necessitates the use of an offset link and could reduce the breaking load by approximately 20%. (Connecting links are the weakest points).
- Roller chains are normally installed horizontally. The links that transmit load are the Tension Side, this is usually the top strand. The tension side transmits torque. On the loose side, the slack allowed is approximately 4% of the span. When the center distance between shafts is greater than 3 feet, or the chain is operated under heavy load, high frequency of starts and stops and the direction of drive is changed often, the slackness allowed in the chain should be approximately 2% of the span.
- The angle of inclination can be up to 60° between the drive sprocket and the driven sprocket.
- In vertical drive the amount of slackness should be approximately 2% of the span.
- Tensioners are recommended to keep chain tight, especially when the chain drive is mounted vertically. Idler sprocket tensioners should have at least 3 teeth engaging the chain. When the drive sprocket is mounted on the lower position the tensioning device should be mounted outside the chain span.

- When the drive sprocket is mounted at the upper position the tensioning device should be placed inside the span.
- In applications when a tensioner device is needed, PTI's **Roll-Ring®** Chain Tensioner may be an option. See section for information on the **Roll-Ring®** Chain Tensioner.



## HP & Torque Required

For sizing chain, it is important to know, the speed, torque and/or Horse Power the chain is to transmit. Listed below are some helpful Torque and Horse Power equations.

### Horsepower:

$$HP = \frac{\text{Force lb} \times \text{FPM}}{33000} \quad HP = \frac{\text{Torque (in lb - inches)} \times \text{rpm}}{63025}$$

$$HP = \frac{\text{Torque (in lb - feet)} \times \text{rpm}}{5252}$$

### Torque:

$$\text{Torque (in lb-inches)} = \frac{63025 \times \text{HP}}{\text{rpm}} \quad \text{Torque (in lb-feet)} = \frac{5252 \times \text{HP}}{\text{rpm}}$$

The chain load should not exceed 10% or 10:1 ratio of the breaking load to application load that is published for the chain. Example: PTI Part No. E50-1 Riv chain has a breaking load of 6,100 lb. The maximum load would be at 10:1 ratio. 6,100lb/10 = 610 lb of load for this chain. For higher loads, use multiple strands or larger chain.

## Maintenance and Lubrication

There are generally three methods of lubrication: manual or drip, bath or oil stream. Manual lubrication is preformed with a brush or spout can. It is the least expensive and the least effective. The bath is preformed via directing the chain into a pool at the bottom of an enclosure of the chain. The chain should intersect the oil pool at the chain pins lowest point. The chain should not be completely submerged in the oil. The oil stream has the chain passing through a leak free enclosure where a slinger disc splashes oil onto the chain.