HOW TO SELECT THE RIGHT SPROCKET FOR YOUR APPLICATIONS
Sprockets are essential to the proper operation of industrial drive and conveyor chain systems. Available in an expansive range of standard and custom configurations, sprocket selection can be a challenging endeavor. Our eBook will help you determine the factors you must consider when sourcing sprockets for your equipment.

When it comes to sprockets for industrial applications, a high level of precision and specialization is required to ensure a proper fit with both the chain and surrounding assembly. Selecting a sprocket with the appropriate specifications is essential for facilitating a smooth, controlled rotation without causing chain drive/conveying systems to slip, jump, seize, or break down prematurely. This eBook provides an overview of how sprockets work, some basic sprocket types, and how to understand when a sprocket should be replaced.
What Is a Sprocket?

A sprocket is a rotating mechanical wheel with teeth that engage with roller or conveyor chains to facilitate their movement in a variety of applications and equipment. As the sprocket rotates around a central shaft, the specially designed teeth engage the gaps in the chain to pull it with a secure grip regardless of whether it is in dirty or oily environments. Although they may resemble gears, sprockets are designed solely to work with chain and not with other sprockets or gears.

Important Specifications

SOME SPECIFICATIONS TO CONSIDER WHEN CHOOSING A SPROCKET INCLUDE:

**TYPE**

Most sprockets can be categorized into one of three industry established types: no hub (Type A), a single hub on one side (Type B), or hubs projected from both sides (Type C).
**PITCH DIAMETER**

Pitch diameter is the diameter of the imaginary circle that passes through the link pin's center while the sprocket is engaged with a chain. This measurement helps determine the appropriate sprocket selection for the intended chain.

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**NUMBER OF STRANDS**

Strands refer to the row or rows of teeth along the sprocket's perimeter. While single-strand sprockets are the most common and versatile option, double, triple or multiple-strand sprockets can engage with multiple-strand chains at once to drive greater torque and power.

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**CALIPER DIAMETER**

Caliper diameter is a measure of the valley of one tooth to its opposing tooth valley.

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**HUB DIAMETER**

On type B and C sprockets, this measures the outside diameter of the hub.

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**LENGTH-THROUGH-BORE (LTB)**

LTB refers to the length of the hub including the thickness of the sprocket plate.

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**SPROCKET PITCH**

Sprocket tooth pitch is based off the corresponding chain measurement from one roller-pin center to the next roller-pin center.
Bore Size
The inside diameter of the hole through the sprocket hub or plate. Bore size must be carefully selected to appropriately accommodate the diameter of the shaft that will run through it.

Number of Teeth
This is the sprocket’s total number of teeth determined by the specific application.

Types of Sprockets

Sprockets come in various designs to suit the needs of specific chain-driven systems. These include:

Roller Chain
Commonly used in industrial and commercial applications, roller chain sprockets transmit force to chains by engaging the rollers in the chain, where the teeth fit between the inside plates of the chain. A variety of applications benefit from these including conveyors, large industrial drives, robotics, motorized assemblies, and much more.

Single-Pitch and Double-Pitch
Single-pitch sprockets have teeth that engage one tooth per chain link. Double pitch sprockets look like single pitch sprockets, but the chain only engages every other tooth. For sizes C2040-C2160H the roller diameter and Inner width are the same as the single pitch version, but the pitch is twice the size (hence the term “double-pitch”). As a result of the pitch difference the pressure angle on the double pitch sprocket is different from the single pitch version, therefore “double-pitch sprocket” tooth counts of 30 or less must be used with “double-pitch chain.” For 31 teeth and above a double-pitch chain can use any standard single-pitch sprocket without any operational deficiency.
SMART TOOTH® SPROCKETS

Sprocket teeth wear out over time due to friction caused by continuous physical contact between the sprocket tooth and the chain roller. Tsubaki manufactures Smart Tooth sprockets with wear indicator pins. These visual wear indicators inform operators and inspectors when a sprocket can still safely perform and when the sprocket needs to be replaced.

BUSHING TYPE

Bushed sprockets can simplify the maintenance of chain systems by allowing only the warn out sprocket portion to be replaced while the bushing remains reusable. Bushings also use a tight tapered mating surface that allows higher torque transmission when compared to simpler keyed assemblies. The close mating surface allows better performance in applications with lots of start/stop operations or shock loads.

STEEL-SPLIT

These sprockets are split in half for easier installation into chain systems that are difficult to access without having to remove the shafts. Operators can position each half within the chain before bolting the two halves together. This allows for replacement of only the sprocket without taking apart the whole assembly and saving operators from having to loosen or reposition the chain.

IDLER

Idler sprockets are designed for applications where the drive chain may experience slack due to long lengths, non-adjustability of the driven shaft, or where the chain has to be guided around an obstruction. Use of idler sprockets prevents chain whipping and uneven distribution of load.

DRUM SPROCKETS

Drum sprockets can be supplied in both long tooth (full face), or A-Plate styles using premium material and engineered to maximize both sprocket and chain performance in drag applications.
How to Tell if Your Sprocket Is Worn Out

To maintain equipment performance and minimize component damage, it is important to regularly check the amount of wear on the sprocket. The following tips can help you identify the early warning signs of sprocket wear so you can avoid premature wear of the chain along with expensive equipment failures and unplanned shut-downs.

**TIP #1**

Make sure the sprocket teeth and the chain are engaging properly together. The individual chain rollers should fall evenly into the valley of each tooth.

**TIP #2**

Hold the chain from the rear of the sprocket and attempt to pull the chain away from the teeth. If a gap can be seen between them, this likely indicates that both the chain and the sprocket are worn.

**TIP #3**

Check the shape of the sprocket teeth. Due to repeated contact with chain rollers, worn sprocket teeth tend to become sharp and/or slightly hooked over time.

**TIP #4**

Inspect the perimeter of the sprocket for indented wear patterns that resemble the chain’s shape. The appearance of this pattern is a good indication that the sprocket needs to be replaced.
Why Tsubaki?

Tsubaki is a global provider of state-of-the-art power transmission and motion control products, including a wide selection of sprockets designed for various chain-driven applications. Manufactured from high-grade, heat-treated steel, our durable sprockets provide reliable, long-lasting performance in even the most demanding industrial operations. Our offerings include:

- **Roller chain sprockets.** We carry a wide range of roller chain sprockets with single and multi-strand designs available, as well as steel-split, Smart Tooth and idler options.

- **Engineering-class sprockets.** Our engineering-class sprockets are precision-manufactured using high-quality materials that provide abrasion resistance, shock load tolerance, and long wear life in rigorous applications.

- **Smart Tooth® sprockets.** Our Smart Tooth® sprockets include patented wear indicator pins strategically placed on the sprocket teeth to provide a visual indication to technicians of when the sprocket needs replacement. This allows operators to replace excessively worn sprockets before equipment failure occurs. This innovative design feature is available on both our roller chain and engineering-class chain sprockets.

- **Drum sprockets.** Available in full-face and A-plate constructions, our drum sprockets are built to offer unmatched wear and misalignment forgiveness in heavy-duty applications. These sprockets can be customized with single or multiple strand configurations.

To optimize the performance of industrial drive and conveyor chain systems, it is critical to choose a sprocket that fits the chain correctly and withstands the specific conditions of your application. At Tsubaki, our engineering expertise and customization capabilities enable us to provide expertly designed sprockets for a myriad of equipment and conditions. We also offer installation assistance, troubleshooting services, and maintenance support to keep your operation running as efficiently as possible.

For assistance with sprocket selection or to learn more about our products, please contact us today.
ABOUT U.S. TSUBAKI

The Tsubaki name is synonymous with excellence in quality, dependability and customer service. An intense focus on research and development, along with continuously modernized production facilities, has resulted in Tsubaki meeting the ever-changing needs of the marketplace.

As a part of this vast, international network of corporate and industrial resources, U.S. Tsubaki offers its customers the finest state-of-the-art power transmission products available in the world. And U.S. Tsubaki is well positioned to meet the challenges of the 21st century as we strive to be the “Best Value” supplier in the industry.

Our global presence affords us unprecedented opportunities to market advanced new products and technologies, and to utilize the intellectual assets we have from some of the brightest minds in business and engineering from around the world. This combined with our continuous improvement of quality and processes, has Tsubaki poised for lasting growth, not only now, but well into the future.

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