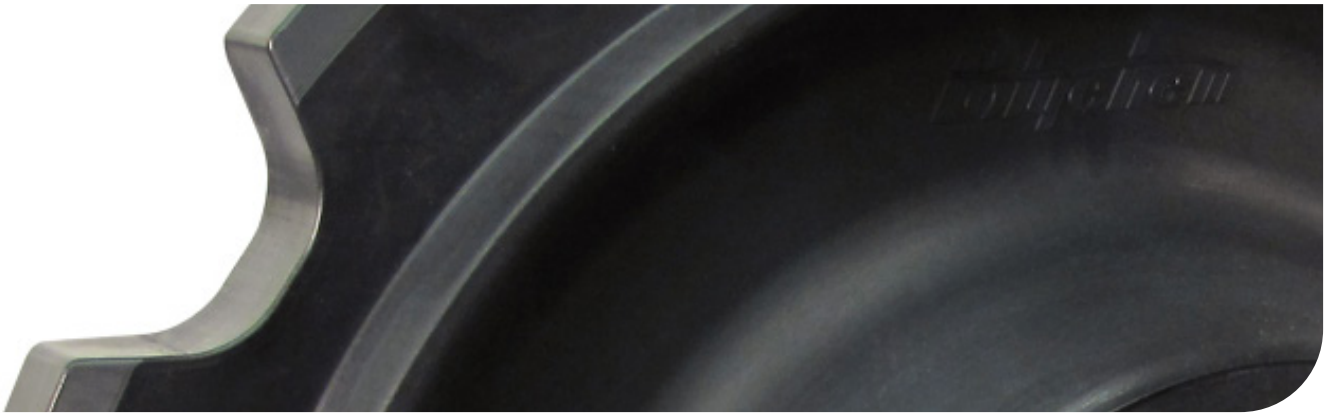

NOT ALL SPROCKETS ARE THE SAME

In rectangular clarifiers, straight-line sludge collector mechanisms have in-tank sprocket gears that are mounted on shafting to transmit torque from the drive unit and help keep the chain and flight system in motion. There is a common misconception that all sprockets are the same, simply because they have the same number of teeth and run on 720-series chain. There are a number of other features that distinguish between a long-lasting, wear-resistant gear and a sprocket that needs to be replaced after a few years due to wear or failure.

Material

Before the early 1980's, most chain and flight systems were furnished with heavy cast iron or steel sprockets. Over time, these cogs became rusted and corroded, causing them to seize up on the shafting and wear out rather quickly. Nonmetallic sprockets were subsequently introduced to the market along with lightweight plastic chains, flights, and accessories that improved system longevity and efficiency. There are currently three major nonmetallic sprocket materials used in water and wastewater clarifiers: UHMW-PE (Ultra-High-Molecular-Weight Polyethylene), Polyurethane, and Cast Nylon 6.

UHMW-PE is an inexpensive option and offers some benefits as a bearing material with its low coefficient of friction and minimum water absorption. UHMW-PE, however, is the softest of the three plastics and has the lowest yield strength. The major issue with UHMW-PE sprockets is their tendency to cold flow and creep. Over time, UHMW-PE will begin to permanently deform under the influence of persistent mechanical stresses. This can quickly lead to overworn teeth, splitting, and keyways smearing.

While Polyurethane is harder than UHMW-PE, there are numerous variants of the material and ranges of hardness. It is important that a proper hardness be specified when selecting the material. Polyurethane can also be attacked by ferric chloride, a common coagulant used in water treatment.

The ideal material for chain and flight collector sprockets is Cast Nylon 6. While more expensive than the above materials, Cast Nylon is twice as hard as UHMW-PE and has tensile strength almost double that of Polyurethane. Cast Nylon wears longer, is more resistant to corrosion, and has a proven track record. In some cases, Polychem's Cast Nylon sprockets have been used in the same tank for over thirty years with no visible wear.

Chain Saver Rims

Chain saver rims are an optional feature offered by some sprocket manufacturers that add life to the sprocket and chain. The chain saver rim allows the curved sidebars of the NCS-720-S collector chain to rest on the rim, keeping the chain barrel from wearing, or being worn from, the sprocket teeth. Polychem's Cast Nylon sprockets feature an integral chain saver rim as standard. Other manufacturers may rivet or glue on a chain saver rim, but this method can lead to the rim coming off of the sprocket over time. Other brands simply do not provide a chain saver rim as a standard.

Hardware

As a standard, Brentwood's Polychem sprocket gears use grade 316 stainless steel hardware. Other suppliers often use 18-8 or grade 304 stainless steel. Grade 316 stainless steel is more resistant to corrosion than the typical alternatives, so it is important to know what is being offered when comparing prices.

Length Through Bore

Length through bore (LTB) is another important characteristic of a collector sprocket. The LTB is essentially the width of the sprocket from outside hub to outside hub. The Polychem standard is 5.25 inches, but other suppliers have a 4-inch LTB as standard. Sprockets with a wider LTB ensure a stronger keyway and have less risk of flexing on the shaft.

Evaluating ROI

When reviewing sprocket pricing between suppliers, it is important to extend consideration beyond initial price. From an ROI standpoint, a Cast Nylon sprocket that is 25% more expensive with an integral chain saver rim may last 3-4 times longer than a UHMW-PE gear with non-chain saver rims and 18-8 hardware. Taking the aforementioned characteristics into consideration when choosing sprocket parts for your system will ensure improved efficiency and lifespan, providing the greatest value in the long run.