In this issue we look at the process involved with lubricating chains at high temperatures. Industries that use chains in high temperature environments vary from food and beverage, building products and glassware.

Two different methodologies of lubricating chains at high temperatures are:

1. Using a liquid lubricant
2. Using a solid lubricant, suspended in a carrier fluid.

**Liquid Lubricants:**

Synthetic base oils, such as silicone fluids, polyalphaolefins (PAO) and diesters, allow for lubrication at higher temperatures compared to petroleum base oils. Although synthetic oils have the same limitations as petroleum oils of thinning out, carbonisation, oxidisation and evaporation, their performance goes beyond the temperature threshold of petroleum based oils.

Polyol ester synthetic base oil provides stability and far less volatility than the diester base oil, commonly found in most industrial synthetic lubricants. At temperatures above 270°C the diester base lubricants lose over five times as much product through evaporation and leave behind a carbon residue.

**Solid Lubrications:**

Graphite is one of the most common solid lubricants in the world with its use dating back to the mid 1500's. Originally used in pencils, the practicality of graphite as a base in high temperature lubricants has been realised for many years now. The graphite is suspended in lubricant using various carriers so that it can be applied to a chain. These carriers can be water based, hydrocarbon based (white oil, kerosene) and synthetics.

The use of graphite in conjunction with a carrier in a lubricant can have its downsides:

- Depending on the carrier supporting the solid lubricant, the temperature of the chain is critical. Quite often extensive time has to be allowed for the chain to cool prior to application.
- It has a tendency to build up on itself, blocking the pathway for the lubricant to reach the pin & bushing.
- Tight tolerances cannot be reached due to the ineffective capillary action.
- It promotes electrical conductivity and as a result galvanic corrosion can occur.
- Its lubricating properties are dependent on the amount of moisture vapour present.

**Ideal high temperature lubricant properties:**

Ideally, a high temperature lubricant should have the following properties to extend chain life:

- Low evaporation rate to reduce oil consumption.
- No carbonisation at high temperature to reduce wear and increase chain life.
- No oxidation to prevent sludge or varnishes forming on the chain.
- Excellent solvency to remove any by-product from other lubricants and to keep the chain clean.
- High load carrying capability, to reduce wear and increase chain life

As new technologies such as polyol ester become available to lubricate high temperature chains, cost effective solutions for best practice lubrication can be achieved. Ideal chain life can be attained without costly downtime and regular upkeep by reducing lubricant consumption, minimising residue and ensuring the lubrication effectively reaches the pin and bushing.