

Q & A: Is This Synthetic Lubricant Superior?

"Theory is that polyalkylene glycols (PAGs) perform better in worm gears than other lubricants due to the lubricity factor involved. Is this true and what benefits do they offer over polyalphaolefin (PAO) worm gear lubricants or mineral oils properly additized for worm gears?"

There are a few reasons why a properly formulated PAG might perform better in specific circumstances than an equally properly formulated mineral oil in a sliding contact zone. Gear oils based on glycol stocks are highly polar. The extra surface affinity provides low frictional coefficients without the use of additives. This could be referred to as "lubricity". Once fortified with the right complex of additives, glycol lubricants can provide exceptional load-bearing performance (film strength).

Glycols can also have a superior pressure-viscosity coefficient, the measure for a lubricant's EHL film formation capability.

As a reference, "At T<80 degrees C, mineral oil gives thicker films than PAO lubricant, and at T<57 degrees C mineral oil gives thicker films than PAG lubricant. In the temperature range 70 to 90 degrees C, there is only 5 percent difference between EHL film thickness of mineral and PAO lubricants. In this same temperature range, a PAG lubricant gives thicker films ranging from 16 percent to 37 percent thicker than mineral oil" (B. Errichello. Selecting Oils with High Pressure-Viscosity Coefficient - Increase Bearing Life by More Than Four Times. Machinery Lubrication Magazine, March 2004).

Obviously thicker EHL film formation contributes to reduced risk of wear and better long-term reliability.

It is worth noting that the performance of a lubricant in any given application depends on a number of factors including performance expectations, machine application, machine design and operating environment. While a PAG might provide superior overall performance in certain cases compared to mineral oil or PAO, there are other cases where a non-PAG lubricant in a worm gear application may be the optimum choice.

Mike Johnson,

Noria Corporation