STUBBORN LUBRICANTS FOR TOUGH APPLICATION

MOSIL LUBRICANTS

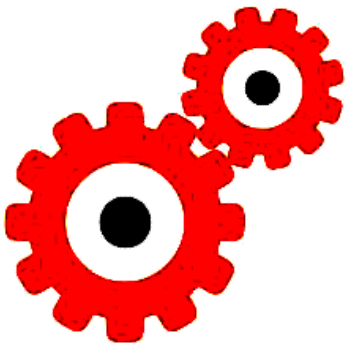
GEAR DRIVE LUBRICANT SELECTION

GEAR DRIVE LUBRICANT PROPERTIES

Selecting proper gear drive lubricant is important to the long term efficient operation of gear drive. Gear drives operate in three regimes of lubrication; viz, full fluid film, mixed film & boundary lubrication conditions. The ideal regime of lubrication for enclosed gear drives is full fluid film lubrication. The Gear drive lubricant's viscosity is sufficient to provide separation of the mating surfaces of gears. Full fluid film is generally formed under conditions of light loads.

PRIMARY FACTORS TO CONSIDER

- Gear Type
  - Spur & Bevel
  - Helical & spiral bevel
  - Hypoid
  - Worm
- Loading Conditions
- Surface Finish
- Transmitted Power
- Gear Speed
- Material Compatibility
- Operating Temperature



Primary Factors	Requirements
Gear Type • Spur & Bevel • Helical & spiral bevel • Hypoid • Worm	• Low slide, Low speed • Moderate slide, Moderate to high load • High slide, High load • Excessive sliding, Moderate to high load
Loading Conditions	Highly loaded gear drives require the use of extreme pressure gear drive lubricants
Surface Finish	Rougher surfaces require high viscosity oils.
Transmitted power	As the load increases, viscosity must be increased.
Gear Speed	The higher the speed of gear drive, the lower is the viscosity needs to be.
Material compatibility	Some types of EP additives may attack yellow metals like brass & Bronze.
Temperature	The viscosity must be selected based on the lowest and highest operating temperatures.

The gear dive lubricant selected for a particular application should match the recommendations of the original equipment manufacturers (OEM). The specifications are also designed to balance the lubrication needs of gears which are usually used in medium to high viscosity lubricants.

SECONDARY FACTORS FOR SELECTION

- Viscosity & viscosity selection.
- Rust & oxidation inhibited gear oils
- Extreme pressure gear oils
- Compounded gear oils
- Synthetic gear oils
- Wear protection of gears.

VISCOSITY & VISCOSITY SELECTION

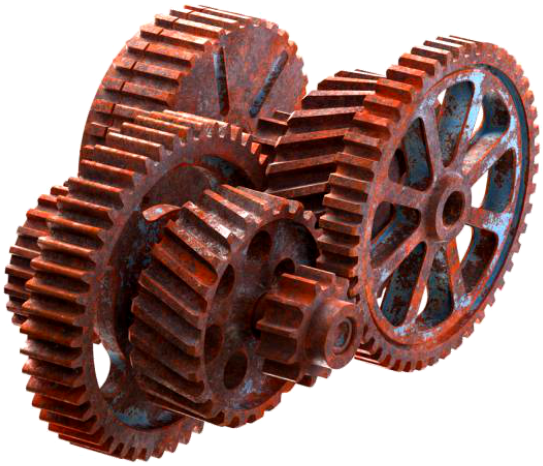
Viscosity helps to maintain the proper thickness of the oil film at operating temperature to keep the mating surfaces of the gears apart by achieving hydro-dynamic lubrication conditions. The viscosity is important to the overall load-carrying capacity of the gear lubricant. The higher the viscosity, the higher the load-carrying capacity of the Gear drive lubricant. The use of too viscous can result in excessive heat generation, excessive power losses,lower gearbox efficiency and improper oil flow. The correct selection will take into consideration room temperature, the operating temperatures, drive loads and operating speeds that are most desirable to keep minimum wear rates.

Viscosity grades available at Mosil :-

ISO VG- 32, 46, 68, 100, 150, 220, 320, 460, 680, 1000

RUST & OXIDATION INHIBITED GEAR OILS

Rust and oxidation inhibited gear lubricants performs well over a wide range of speeds and ambient temperatures ranging from -15˚C to 121˚C. R & O inhibited oils are most commonly used to lubricate high-speed single helical, herringbone reduction gear sets, that are subjected to light to moderate loads. They are also used in the lubrication of spur, straight bevel and spiral bevel gear drives that are operating at light loads.



Constant re-lubrication by splash lubrication or circulation lubrication systems of the gear drives is preferred because R & O inhibited gear oil do not adhere to the surface of the gear teeth. They can be used effectively used to cool the gear mesh and flush the wear particles or debris.

EXTREME PRESSURE GEAR DRIVE OILS

EP gear drive lubricants are recommended for use with the spur, bevel, helical, herringbone and hypoid gear drives that are operating at high load conditions, moderate to high sliding conditions and high-transmitted power conditions.EP gear lubricants contain chemically active additives systems, care must be taken if they are used in systems where the gears and bearings are lubricated from the same system.

Some EP gear lubricants will contain solid lubricants such as graphite or molybdenum disulfide held in a suspension. Solid lubricants are formulated into the gear drive lubricant to improve its load-carrying capacity. When EP gear lubricant containing solid lubricants are used, care must be taken if fine filtration is used. Extremely fine filtration can remove solid lubricants. The solid lubricants should be colloidally suspended and have a particle size no greater than 0.5 microns.

These EP gear drive lubricants perform well over a range of gear sizes and speeds and ambient temperatures ranging from -15˚C to 121˚C.

COMPOUNDED GEAR DRIVE OILS

Compounded gear oils are used to lubricate enclosed worm gear drives, where the high sliding action of the gear teeth requires a friction-reducing agent to reduce heat and improve efficiency. Their use is limited by an upper operating temperature of 82˚C. Constant re-lubrication by either splash lubrication or circulation lubrication systems of the gear teeth is necessary. Most worm gear drives normally require ISO 460, ISO 680, ISO 1000 Compounded gear drive oils. The viscosity grade mostly depends upon the worm gear drive's speed and operating temperature. The lower the worm's gear speed, the heavier the viscosity grade.

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SYNTHETIC GEAR DRIVE OILS

Synthetic gear drive oils are primarily used in spur, bevel, helical, herringbone and hypoid worm gear drive applications. Synthetic gear drive lubricant can contain R & O inhibited additives, anti-wear or EP additives. They are used in gear drive applications where very low or high operating temperatures are observed.

Benefits of Synthetic oils observed :

- Improved oxidation stability Improved Thermal stability.
- Improved viscosity index
- Improved low-temperature characteristics
- Reduced flammability risks.
- Improved lubrication at temperatures above 185°C
- Resistance to the residual & deposits formation at elevated temperatures
- Lower traction coefficients.

WEAR PROTECTION OF GEARS

Many industrial application, gear drives are designed to sustain high loads. Many tests measure the gear drive lubricant's anti-wear and EP properties.
Some of those are listed below:

- Four ball weld load
- Four ball wear scar
- Timken OK load

MOSIL SOLUTION FOR GEAR DRIVES

Mosil offers a wide range of speciality lubricants over all types of industries. Mosil has both mineral oil as well as synthetic oil-based products having satisfactory performance in their respective industries. Mosil also has bag full solutions for gear drive lubricants as well. Mosil offers products for all types of variable load, speed, temperature conditions of gear drives.

Mosil Series for Gear drives :-

- GEARLUBE - SP series-
  - SP-e
  - SP-s
- GEARLUBE - PAG series
- GEARLUBE - EC series

GEARLUBE

Mosil also offers lubricating greases for gear drive applications, here greases having NLGI 00, consistency is necessarily important. Application of these products by splash, spray, fill, continuous or centralized lubrication methods can be used for lubrication. Gear greases are used for open gear drives. For a critical application or leakage problems in enclosed gear drives fluid greases are preferred, as they perform satisfactorily.