

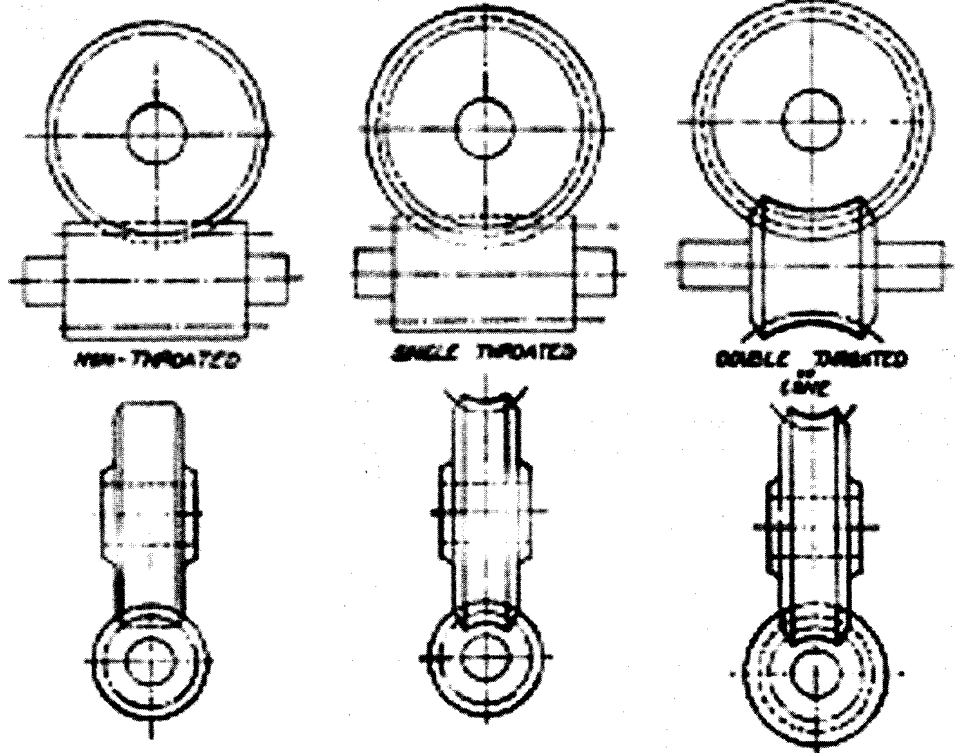


WHY THE NEED FOR WORM GEAR LUBRICANTS

Worm gearing is used to transmit motion and power between nonintersecting shafts (such as shafts at right angles to each other). This is often the case where space is very limited. High gear ratios may be obtained, often over 300:1. However, at high ratios the efficiency can be as low as 40-50%. The worm drives by its threads sliding into contact with the teeth of the worm wheel (gear). This constant sliding action generates heat due to friction and therefore adequate cooling and superior lubrication must be provided for gears working at high sliding velocity and load.

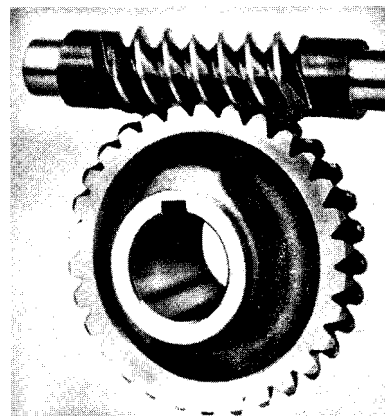
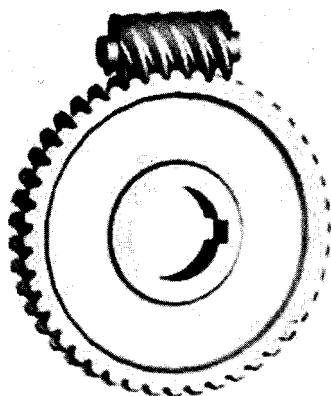
Worm gears have an interesting property that no other gear set has: the worm can easily turn the gear, but the gear cannot turn the worm. This is because the angle on the worm is so shallow that when the gear tries to spin it, the friction between the gear and the worm holds the worm in place. This feature is useful for machines such as conveyor systems, in which the locking feature can act as a brake for the conveyor when the motor is not turning. This static action can cause tremendous pressures on the film of oil, often rupturing the film allowing metal-to-metal contact.

There are three basic types of worm gears:



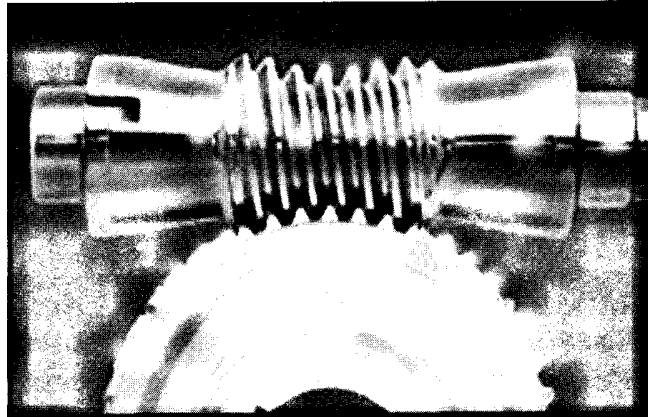
1. A cylindrical (non-throated) worm gear is similar to a rack and pinion and has straight teeth. This type of gearing uses gear oils such as the ALMASOL Vari-Purpose Gear Lubricants.

2. A single enveloping (single throated) worm gear is a helical cut and has a parallel-sided gear mating with a curved (concave) worm wheel. This type of gear is more forgiving for position and alignment to tolerance problems. These gears may use ALMASOL Worm Gear Lubricants or the ALMASOL Vari-Purpose Gear Lubricants (consult manufacturers specifications)





3. A double enveloping (double throated) worm gear is helical cut and has a curvature of both gears that increases the surface of contact between the gears. This can be very useful for power applications but also generates the most heat from the sliding motion. Due to the extreme sliding motion only ALMASOL Worm Gear Lubricants should be used.



Many worm wheels (gears) are made of a soft "yellow" metal material, bronze, which is very sensitive to active sulfur. Most EP gear oils contain sulfur as part of the EP package, which when activated can etch the gears.

As a result of the operating conditions listed, it is very important to provide the gears with an oil that adheres to the metal surfaces (whether the worm is above or below the wheel), provides an excellent film strength and prevents asperities from welding to each other from the sliding action.

ALMASOL® Worm Gear Lubricants, ISO 460 and 680, provide excellent adherence through compounding agents, which are blended into 100% select paraffinic base oil for excellent film strength. Then they are fortified with ALMASOL®, LE's proprietary wear reducing additive. ALMASOL® is designed to adhere to all metal surfaces (worm and wheel) providing extra pressure performance and operates in a laminar fashion. This allows much easier sliding action with minimum wear and less temperature.

Food Grade 4007-4008 QUINPLEX® White Worm Gear Lubricants are blended with a pharmaceutical grade base oil along with an anti-stickslip compound for the extreme sliding conditions found in worm gears, and QUINPLEX®, LE's proprietary performance enhancing additive to provide more adherence and cohesiveness. 4007-4008 QUINPLEX® White Worm Gear Lubricants meet the requirements for USDA H1 and are NSF H1 Registered.

