GAEYAH TRANSMISSION

## VISION:

**'GAEYAH'S VISION IS TO OFFER AFFORDABLE POWER TRANSMISSION SOLUTIONS, EMPOWERING CUSTOMERS TO IMPROVE THEIR PRODUCT PERFORMANCE'**

## VALUES

OUR WORK WILL BE GUIDED AND INFORMED BY OUR BELIEFS AND COMMITMENTS TO:

**INCLUSIVENESS-** RESPECT ALL LIVING BEING

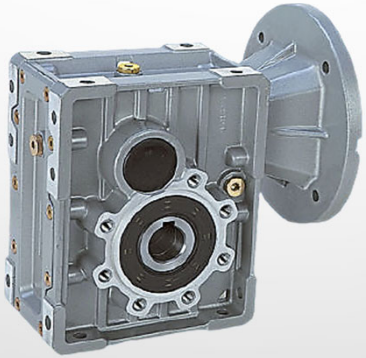
**HONESTY-** UPRIGHT & FAIR

**COMMITMENT-** PROMISE TO PERSEVERE

**INNOVATE-** CONTEMPORARY SOLUTION

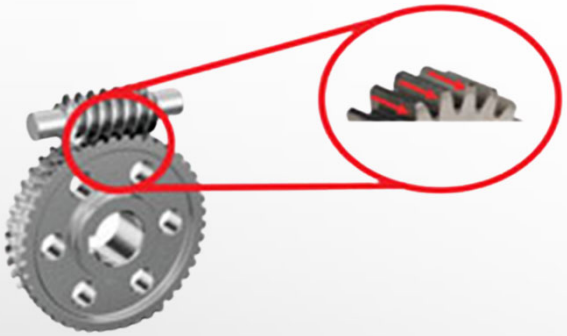
**PASSION-** EMPATHIZE & LISTEN

# WHY HYPOID OVER WORM??

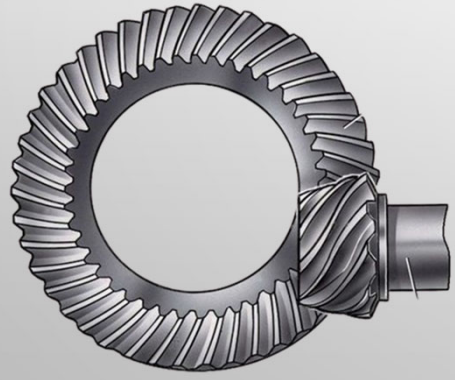


- Small motor size
- Energy Saving
- Low running cost
- Low maintenance
- Low downtime
- Service Life

# WORM VS HYPOID…



Sliding friction visualization



Rolling friction visualization

**Why worm gears inefficient??**

- The worm is a screw-like gear, that rotates perpendicular to its corresponding worm gear . In a worm gearbox with a 5:1 ratio, the worm will complete five revolutions while the output worm gear will only complete one. With a higher ratio, for instance 30:1, the worm will complete 30 revolutions per one output revolution.
- To rotate the worm gear, the worm only experiences sliding friction. There is no rolling component to the tooth contact . In high reduction applications, such as 30:1, there will be a large amount of sliding friction due to the high number of input revolutions required to spin the output gear once.
- Since there is a lot of tooth contact, the initial energy to start rotation is higher than that of a comparable hypoid reducer. When driven at low speeds, the worm requires more energy to continue its motion along the worm gear, and a lot of that energy is lost to friction.

**Why Hypoid gears efficient??**

- The hypoid gear set is a hybrid of bevel and helical gear technologies. They experience friction losses due to the meshing of the gear teeth, with minimal sliding involved. These losses are minimized using the hypoid tooth pattern which allows torque to be transferred smoothly and evenly across the interfacing surfaces. This is what gives the hypoid reducer a mechanical advantage over worm reducers.

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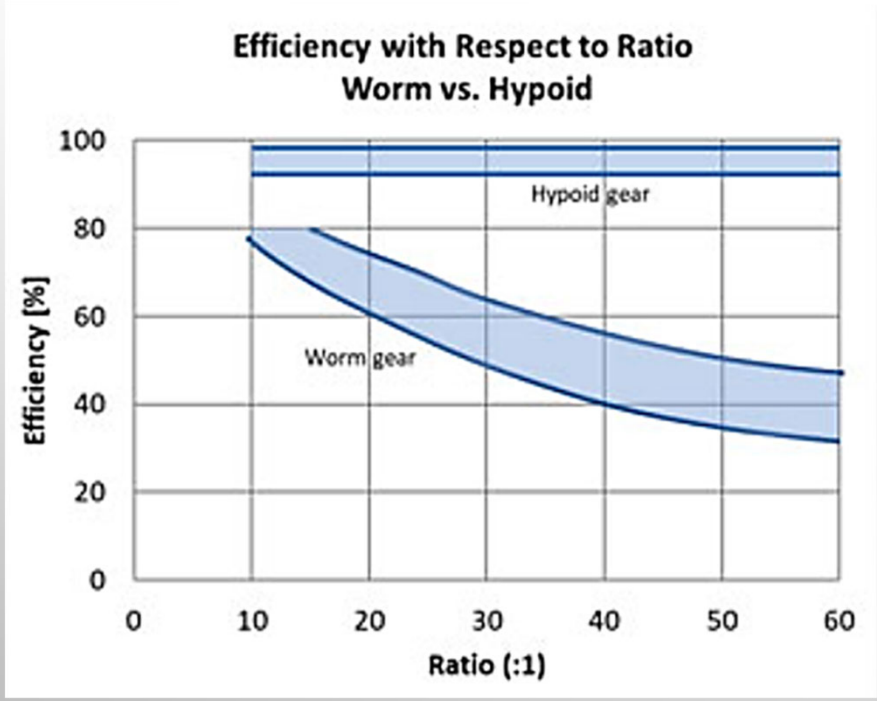
# WORM VS HYPOID




Worm vs Hypoid Efficiency

- **Efficiency of worm units rapidly go down with ratio >15/1**
- **The motor gets overloaded to coverup the inefficiency leading to increase in temp of motor. To compensate it customer use a larger motor**

- Worm η% Vary from 85% to 15%...
- Hypoid η% 96-90%

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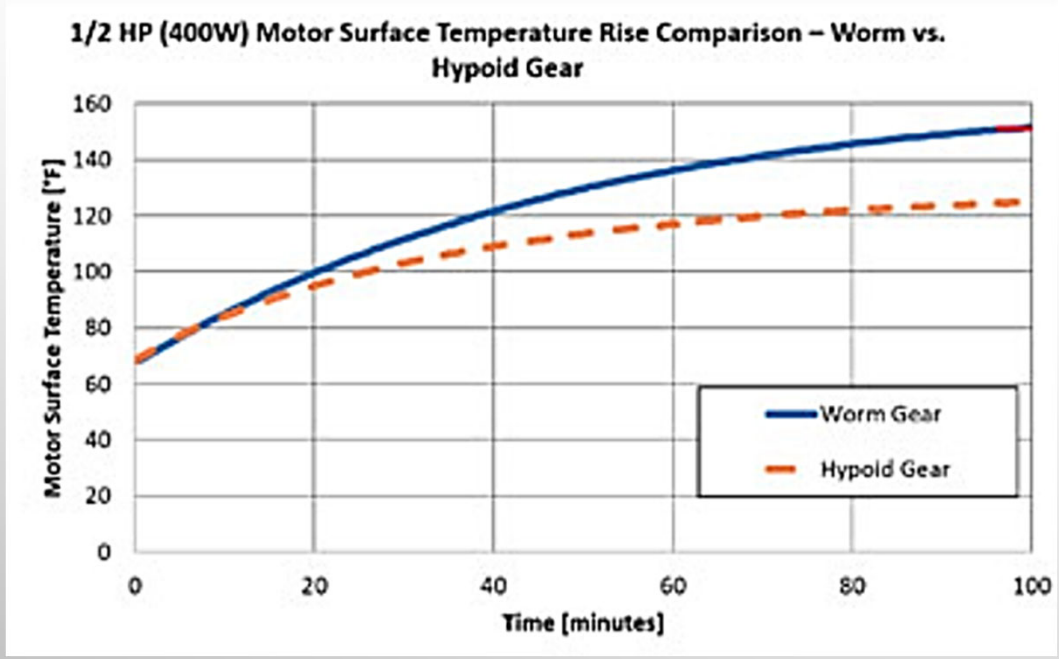
# WORM VS HYPOID




5. Motor surface temp Worm vs Hypoid

Hypoid drives can have a higher upfront cost than worm drives. This can be attributed to the additional processing techniques required to produce hypoid gearing such as machining, heat treatment, and special grinding techniques. This price difference is made up for over the lifetime of the gearmotor due to increased performance and reduced maintenance.

A higher efficiency hypoid reducer will ultimately save energy and maximize the energy being transferred from the motor to the driven shaft. Since worm gears produce more friction they run much hotter. In many cases, using a hypoid reducer eliminates the need for cooling fins on the motor casing, further reducing maintenance costs that would be required to keep the fins clean and dissipating heat properly. A comparison of motor surface temperature between worm and hypoid gearmotors can be found in Figure 5.

# WORM VS HYPOID

**Why efficiency is important?**

- Geared motors have a very long service life, choosing a high-efficiency reducer will minimize costs related to operation and maintenance for years to come. Additionally, a more efficient reducer allows for better reduction capability and use of a motor that consumes less electrical power.
- Single stage worm reducers are typically limited to ratios of 5:1 to 100:1, while hypoid gears have a reduction potential of 5:1 up to 295:1. Typically, hypoid gears themselves only go up to reduction ratios of 10:1, and the additional reduction is provided by another type of gearing, such as helical.
- Since hypoid reducers run cooler,
  - No maintenance required to keep them running at peak performance
  - Frequent lubricating oil change is not required as the gear unit runs fairly at low temp
  - Low Inertia help to in startup even with load
  - Even in a scarcely ventilated location the gear unit will function without much temperature rise
  - Life of oil seal increased due to low temperature
  - It eliminates dust accumulation near breather
  - Reduced downtime and increased production

- Low power motor can be used
- Reduced power consumption
- Running cost goes down

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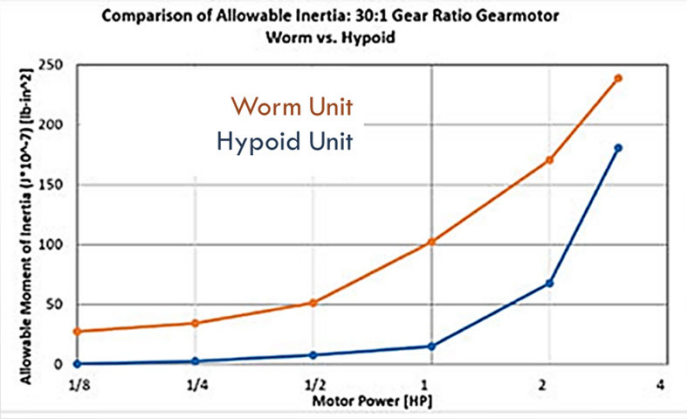
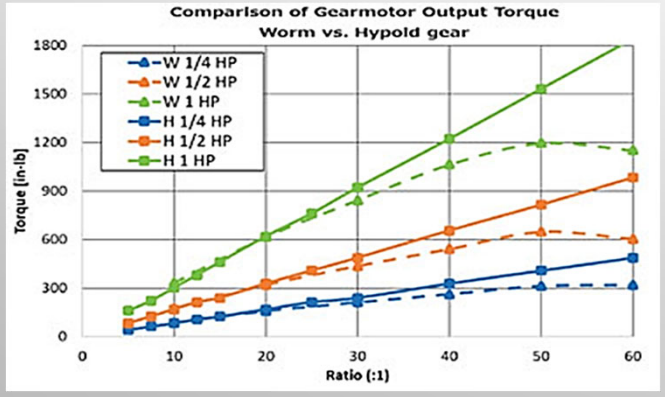
# WORM VS HYPOID




6. Worm vs Hypoid gear allowable inertia




7. Worm vs Hypoid gear output torque

- Hypoid reducers can move loads from a dead stop with more ease than worm reducers (Figure 6).

- Both comparisons, of allowable inertia and torque produced, were performed using equally sized motors with both hypoid and worm reducers. The results in both studies are clear: hypoid reducers transfer power more effectively.

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# WORM VS HYPOID…

**“Break-In” Period**

- **Worm gear**
  - Do not run at peak efficiency until a certain “break-in” period has occurred. Worms are made of steel, with the worm gear being made of bronze. Since bronze is a softer metal it is good at absorbing heavy shock loads but does not operate effectively until it has been work-hardened. The heat generated from the friction of regular operating conditions helps to harden the surface of the worm gear.
- **Hypoid Gears**
  - With hypoid gear sets, there is no “break-in” period; they are typically made from steel which has already been carbonitride heat treated. This allows the drive to operate at peak efficiency from the moment it is installed.

# GAEYAH THANKS YOU

& Eagerly wait for your feedback