DOWNLOAD PDF DESIGN OF WORM GEARBOX

Chapter 1 : Worm Gears: Technical Information

This worm gear design tutorial will discuss the basics of the worm gear box design calculation using the AGMA empirical formula. slide 1 of 4 A worm gear box must contain a worm and a mating gear (helical gear) and normally the axis of the worm is perpendicular to the axis of the gear.

This is the disc gear drawing from the aliexpress page, with 8mm bore and 20 mm distance from the center of the bore to the worm gear contact point. Unfortunately, the gear I received does not match this drawing! The gear I received did not match this drawing. The first thing I did when I received the gears was make measurements to confirm their dimensions. I made models of the gears that were shipped, and drawings with critical dimensions from the model. Here is the dimensioned worm gear drawing and here is the disc gear drawing. The ideal axle center to axle center spacing is 29 mm. One of my early prototypes used 29 mm spacing and when I assembled everything, the gears were binding, so I moved them apart a little in the next couple prototypes. The final design spaces them at There should be no backlash. The next step is to design a printable box to enclose the gears and bearings while maintaining those critical relationships. For example, a lot of designs for 3D printed motor mounts use plastic shaped like L brackets, sometimes with a little reinforcing webbing examples: That sort of thing might be rigid enough is it is made of steel or even aluminum, but plastic? I think of the design in terms of starting from a solid block and removing as little plastic as possible to accommodate the other parts. Two styles of printed plastic motor mount. Which do you think will flex more when belt tension is applied? I used the green type design technique for this gearbox. I started with a solid block of plastic and removed just enough material to accommodate the parts that have to fit inside or attach to it. If the print has the holes for the bearings printed in the vertical walls, the outer surface of the holes will be made of stacked layers, and will be rough, especially at the top and bottom, because of the nature of 3D printing in layers. Early prototype gearbox printed as a single piece with holes for bearings in vertical walls. Note rough areas at top and not visible, bottom of the bearing mounting hole Bearing inserted into hole. Will it line up with the bearing on the other side of the box? Bosses around screw holes help align the halves of the box when assembling. Bearing inserted into mounting hole. Will it line up with the bearing on the other side? I made a prototype using a single printed piece the red one in the photos, above but it had a couple problems. The bearing holes that require critical alignment were "iffy" because of the way the print layers stack and the rough surfaces at the bottom and top of the holes. It would also be difficult to assemble because of the tight space for mounting the bearings, washers, and disc gear. The next couple prototypes were made in two pieces with the bearing mounting holes printed flat on the bed. I added bosses to align the two sides of the box and ensure alignment of the gears and bearings when the part was assembled. The bosses surround the screws that hold the halves of the box together. When you design two parts to be screwed together like this, the piece where the screw will be inserted will have a loose fit hole for the screw and the other piece will be a tight fit where the screw will roll its threads into the plastic. The boss will go on the part where the screws are inserted and the receptacle will go on the part into which that the screw will cut threads. If you do it the other way, when you drive in the screw, the relatively thin plastic boss is liable to break off. Bosses the collar surrounding the screw in one half of the gearbox align it with the other half that has matching receptacles. The screw hole in the boss allows the screw to pass freely. When designing prints to fit real world parts like bearings, you have to account for the smaller printed hole sizes that FDM printing produces. In my printer, experience has taught me to make holes 0. The bearings fit into the printed box halves tightly. Screw the "A" side on the left of the box to the motor, insert the output shaft assembly, put the "B" side of the box right on the shaft and screw it to the motor, then screw the two halves of the box together. The two piece gearbox was a much easier to assemble option, but you have to follow a specific sequence because the over-sized disc gear mounting collar interferes with tool access to mount the motor. The design of the Z axis, and dimensions of common frame materials have to be considered when figuring out how to mount the gearbox. Fusion sure can do some nice rendering This is the "A" side of the gearbox that gets screwed to the motor as a second assembly step after first mounting the worm gear on the motor shaft. The "B" side of the

gearbox, on the right, gets mounted after the bearings, shaft, disc gear and washers are put in place. Once the whole thing is assembled you can bolt it to the t-slot using a single bolt. Performance tests The design above is a generic design that is intended for putting into new printer designs. I wanted to test the performance of the gearbox and thought about how to build up a test jig and came to the conclusion that the easiest thing to do would be to replace the Rino in UMMD and test it in the printer, so I designed modified the generic version to be an almost drop-in replacement for the Rino. I also switched to GT2 belt and since the drive pulley diameter changed I had to reprint the spacers for the pillow blocks and the belt clamps. After all that, I installed it and ran some tests. Belt stretch test prep: Notice that when I moved the Z axis in 1 mm steps every other number looked about right while those in between were a little off. Print test I prepared a test print to see how well the new Z axis drive would work. I printed in um layers and this was the result: This is not wobble. The difference is that wobble is a misregistration of the print layers caused by inaccuracy of the bed to nozzle position that can be caused by unwanted lateral movement of the bed or the extruder nozzle. If you have wobble, one side of the print will bulge and the opposite side will be concave. In banding like this, the layers become too thin causing the extruded plastic to squish out along the sides of the nozzle creating bulges that go all the way around the print and even in the infill ribbing. A closer look at the layers and the bulging. The bulges repeat every 2 mm. The worm gear rotates once for every 2 mm of Z axis motion, so there seems to be a problem with the worm gear. The disc gear rotates once for every 80 mm of Z axis motion, so a much taller print would reveal any defects in the disc gear. Error The worm gear rotates once for every 2 mm of Z axis movement, so the banding points to the worm gear as the source of error. The error may be in the tooth surface in which a divot will cause the disc gear to not rotate as much as it should resulting in smaller Z displacement. Or it could be the bore of the worm gear is off-center. I stepped the Z axis in 0. A single tooth of the worm gear engages the disc gear, so it may be that shifting the worm gear along the motor shaft would allow one to find a tooth that is better or they might be worse. Other gears are available, and I may revisit this topic at some time in the future if I run into a source of inexpensive, high quality gears. In the meantime, I put the Rino back into the printer but changed to 40 tooth pulleys on the 3 mm pitch belt, yielding resolution of 50 full steps per mm. Changing the pulleys required a change to the belt clamp design and the upper pulley plates.

Chapter 2 : 8 Design Considerations for Worm Gear Jacks - Making Motion Work

Insert 1 gear On the ribbon, click Design tab Power Transmission panel Worm Gear. In the generator, Design tab: Insert the values to the Common area. In the Worm gear area, select Component from the list.

Given a single start worm, a 20 tooth worm wheel reduces the speed by the ratio of With spur gears, a gear of 12 teeth must match with a tooth gear to achieve the same Therefore, if the diametrical pitch DP of each gear is the same, then, in terms of the physical size of the tooth gear to that of the 20 tooth gear, the worm arrangement is considerably smaller in volume. A double bass features worm gears as tuning mechanisms Types[edit] There are three different types of gears that can be used in a worm drive. The first are non-throated worm gears. The second are single-throated worm gears, in which the worm wheel is throated. The final type are double-throated worm gears, which have both gears throated. This type of gearing can support the highest loading. It is also known as globoidal wormgearing. This can be an advantage when it is desired to eliminate any possibility of the output driving the input. If a multistart worm multiple spirals is used then the ratio reduces accordingly and the braking effect of a worm and worm-gear may need to be discounted, as the gear may be able to drive the worm. Worm gear configurations in which the gear cannot drive the worm are called self-locking. Whether a worm and gear is self-locking depends on the lead angle, the pressure angle, and the coefficient of friction. Applications[edit] A worm drive controlling a gate. The position of the gate does not change once set In early 20th century automobiles prior to the introduction of power steering, the effect of a flat or blowout on one of the front wheels tended to pull the steering mechanism toward the side with the flat tire. The use of a worm screw reduced this effect. Further worm drive development led to recirculating ball bearings to reduce frictional forces, which transmitted some steering force to the wheel. This aids vehicle control and reduces wear that could cause difficulties in steering precisely. Worm drives are a compact means of substantially decreasing speed and increasing torque. Worm drives are used in presses , rolling mills , conveying engineering , mining industry machines, on rudders , and worm drive saws. In addition, milling heads and rotary tables are positioned using high-precision duplex worm drives with adjustable backlash. In the era of sailing ships, the introduction of a worm drive to control the rudder was a significant advance. Prior to its introduction, a rope drum drive controlled the rudder. Rough seas could apply substantial force to the rudder, often requiring several men to steer the vesselâ€”some drives had two large-diameter wheels so up to four crewmen could operate the rudder. Truck final drive of the s Worm drives have been used in a few automotive rear-axle final drives though not the differential itself. They took advantage of the location of the gear being at either the very top or very bottom of the differential crown wheel. In the s they were common on trucks; to gain the most clearance on muddy roads the worm gear was placed on top. In the s the Stutz firm used them on its cars; to have a lower floor than its competitors, the gear was located on the bottom. An example from around was the Peugeot The worm gear carries the differential gearing, which protects the vehicle against rollback. This ability has largely fallen from favour due to the higher-than-necessary reduction ratios. A more recent exception to this is the Torsen differential , which uses worms and planetary worm gears in place of the bevel gearing of conventional open differentials. Very heavy trucks, such as those used to carry aggregates , often use a worm gear differential for strength. The worm drive is not as efficient as a hypoid gear, and such trucks invariably have a very large differential housing, with a correspondingly large volume of gear oil , to absorb and dissipate the heat created. Worm drives are used as the tuning mechanism for many musical instruments, including guitars , double-basses , mandolins , bouzoukis , and many banjos although most high-end banjos use planetary gears or friction pegs. A worm drive tuning device is called a machine head. Plastic worm drives are often used on small battery-operated electric motors, to provide an output with a lower angular velocity fewer revolutions per minute than that of the motor, which operates best at a fairly high speed. This motor-worm-gear drive system is often used in toys and other small electrical devices. A worm drive is used on jubilee-type hose clamps or jubilee clamps. Occasionally a worm gear is designed to run in reverse, resulting in the output shaft turning much faster than the input. Examples of this may be seen in some hand-cranked centrifuges or the wind governor in a musical box. Left hand and right

hand worm[edit] Helical and worm handedness A right hand helical gear or right hand worm is one in which the teeth twist clockwise as they recede from an observer looking along the axis. The designations, right hand and left hand, are the same as in the long established practice for screw threads, both external and internal. Two external helical gears operating on parallel axes must be of opposite hand. An internal helical gear and its pinion must be of the same hand. A left hand helical gear or left hand worm is one in which the teeth twist anticlockwise as they recede from an observer looking along the axis. A double roller variant was invented in the Indian subcontinent , for use in roller cotton gins , in the thirteenth or fourteenth centuries.

Chapter 3 : The Right Way to Lubricate Worm Gears

Axial pitch is used as a basis for this design standard because: 1) Axial pitch establisheslead which is a basic dimension in the production and inspection of worms; 2) The axialpitch of the worm is equal to the circular pitch of the gear in the central plane; and.

Plan view of contact line on worm End The lead on the right and left tooth surfaces of worms are normally the same. If it is varied as shown in Figure 6. Direction of adjustment Number of Threads in Worms The number of threads in a worm is the number of teeth in a worm. The speed transmission ratio of a worm and worm gear set is obtained by dividing the number of teeth of the worm gear by the number of threads of the worm. When the number of threads of a worm is one, as the worm shaft rotates once, the worm gear advances one tooth, while when the number of threads of a worm is 2, the worm gear moves just two teeth. This indicates that a set of worm-worm gear can achieve great speed reduction in one step. By the way, when there are more than two threads in a worm, it is called multi-thread worm. For the two, the advancing angle of the teeth are also different. Also, as a set of worm gears, there are right hand and left hand threads so that, for example, right hand thread worm and left hand thread worm gear cannot be used together. By the way, the single thread combination below yields a speed reduction ratio of 50, while the double thread combination produces a speed reduction ratio of Duplex Worm Gear to adjust backlash The objectives, characteristics and how to use duplex worm gears is briefly listed below. In order to adjust worm gear backlash or to reduce the increased backlash due to wear, it is very difficult to change the center distance between the worm gear and worm without a possible major design modification. The duplex worm gear was designed to address this problem and it is suitable in applications where a small backlash high precision is needed. In this system, the worm gear side has the same tooth thickness around the circumference as other cylindrical gears, but on the worm side, different leads are used for the opposite tooth face leading to continuously changing tooth thickness. After the center distance is fixed, the actual adjustment of backlash is done by moving the worm axially with shims or screws. In all cases, we do not recommend zero backlash since it is necessary to maintain a certain level of backlash in order to prevent the disruption of oil film. Principle of Self-Locking Feature of Worm Gears Self-locking means it is not possible to drive the worm using the worm wheel, and this feature is used in such things as reversing prevention systems and roll-up mechanisms. As the lead angle gets larger, it becomes less self-locking. Others Ball screws have small coefficient of friction due to the rolling contact at the screw. Problem areas of Self-Locking Because it is relying on the coefficient of friction, self-locking lacks stability. When there is vibration, it is possible to reverse rotate. Coefficient of friction is smaller when the surface roughness is low It is difficult to self-lock with ground worms. Hourglass worm gear This article is reproduced with the permission. Masao Kubota, Haguruma Nyumon, Tokyo: There are special types of worm gears, whose pitch surface is gained by a rotating arc which fits the part closest to the worm of pitch circle around the worm shaft in central section see Pic 6. The Hindley worm or cone worm correspond to the former and have straight-line teeth profile in central section as in Pic 6. Some worm gears use involute helical gear. This type of worm gear usually meshes near the central section as for Hindley worm, all the teeth of the worm are constantly in line contact in central section and has larger loading capability, but needs to be assembled precisely.

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Chapter 4 : TVT Helical, Bevel, & Worm Gearboxes

We offer worm and gear design expertise, many standard sizes to choose from, and custom manufacture of worm gears to print. In addition, we can modify standard worm gears when a full custom build isn't an option.

If there are questions or you require clarifications, please contact our technical department. Caution on Performing Secondary Operations If you are reboring, it is important to pay special attention to locating the center in order to avoid runout. For worm shafts, it is ground portion of the shaft. Therefore, use the bore or shaft for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface. To open up the bore to its maximum, calculate the bore size so that the tooth strength is weaker than the strength of the remaining material. For machining the maximum bore diameter, it should be designed so that the thickness between hub diameter or root diameter to bore diameter has more strength than the gear strength. Since worm wheels are molded products, they may have air bubbles inside the material. In case you find air bubbles inside when performing secondary operations, and if the bubbles are found to be troublesome, please contact us. Points of Caution in Assembling KHK stock worms and worm wheels are designed such that when assembled according to the specified Mounting distance with a tolerance of H7 to H8, the backlash shown in the product tables is obtained. Do not attempt to eliminate backlash by pushing worms into worm wheels or operate with the worm shifted in the direction along the tooth. The figure below shows the datum clamp face of a worm wheel. When assembling worm gears, be sure that the worm axis is in the center of the worm wheel face width. Because of the helix of the gear teeth, worms and worm wheels produce axial thrust forces. The directions of thrust depend on the hand of the helix and the direction of rotation. This is illustrated below in Fig. The bearings must be selected properly to be able to handle these thrust forces. See the "Gear Forces" section in the technical reference. Because large thrust forces act on worms, if they are not secured to the shaft firmly, they tend to shift. Use of step shafts, set screws, dowel pins, etc. Also, check for loosening of bearings due to thrust forces. Verifying the Orientation of Assembly How well the worms and worm wheels are assembled has large effects on the friction of the unit. The tooth contact at the time of assembly must be checked for correctness as shown below.

Chapter 5 : Helical Worm Gearbox - Fenner Series C

A worm drive is a gear arrangement in which a worm (which is a gear in the form of a screw) meshes with a worm gear (which is similar in appearance to a spur gear). The two elements are also called the worm screw and worm wheel.

To overcome these challenges, you must understand not only the complexities of worm gears but also which qualities to take into account when choosing a worm gear lubricant. Worm Gear Designs A worm gear is a non-parallel, non-intersecting axis design consisting primarily of two gear elements: Technically, the entire worm gear system should be called a worm drive or worm gearset to avoid confusion. The worm always drives the worm wheel. This design characteristic is due to the extreme helical angle, which is nearly 90 degrees. The worm drive resembles the design of the crossed helical gear configuration, except the gear teeth on the worm of a worm drive will circle around the circumference of the worm at least once. Since the worm may have as little as one tooth that spirals radially around the helix, the number of teeth on the worm is more appropriately identified by the number of starts or threads. There are three categories of worm drive designs that describe the degree to which the gears mesh together: Non-throated or non-enveloping is the most basic design in which the worm and worm wheel are both cylindrical in shape. This allows for simplistic manufacturing, but the limited contact zone of a single point on one or two gear teeth can become problematic. In single-throated or single-enveloping designs, one of the gear elements most commonly the worm wheel has concave helical teeth for contour or envelopment of the gear teeth onto the worm. This enables the contacting zone to increase to a line. Double-throated double-enveloping or globoidal designs not only have concave helical teeth on the worm wheel, but the worm is also shaped like an hourglass so the two gear elements wrap around each other during motion. This results in nearly eight times more contact area in the shape of a radial band with three or more teeth in contact. As the contact surface area increases, the torque capacity, load-holding ability shock load resistance and durability are improved. Enveloping gear designs also have a lower anticipated wear rate as a result of the load distribution. Worm drive manufacturers attempt to optimize this contact relationship between the two gear elements for improved reliability. Other notable advantages of worm drives over potential gear system alternatives include: A worm drive can be designed with a gear ratio of more than to-1, in comparison to that of a helical gear, which may be limited to to-1 on a single reduction. The gear ratio for worm drives is the number of teeth on the worm wheel to the number of threads or starts on the worm. The high gear ratio and configuration of the two gear elements allow for a compact design, making the worm drive a great option for space-limited areas. In addition, the number of moving parts is reduced along with the opportunities for failure. However, this may be partially offset by a loss in efficiency from large increases in torque. Many worm gear drives at higher ratios under specific conditions may exhibit a self-locking property while those with lower gear ratios are known to freely reverse direction of power. In other words, the worm wheel cannot easily be rotated independently to force movement on the worm. This static self-locking ability may only be possible when the lead angle of the worm is less than the static friction angle of the mating materials. Nevertheless, while this can be advantageous, the need for a backstop or a brake to prevent unexpected reverse rotation is still very important, as back driving is still a possibility under certain circumstances, such as when it is faced with sufficient vibration or when gear teeth surfaces polish over time. With the precise movement of worm drives, particularly in double-enveloping designs, backlash play between gear teeth can be greatly minimized. This is crucial in certain applications such as robotics. Low noise and vibration results from minimal moving components in worm drives in comparison to alternative gear designs. Lubrication Challenges Worm drive designs have one major drawback: This poses a significant challenge because the lubricant is continually scraped aside. The sliding friction losses result in elevated temperatures and inadequate hydrodynamic pressure development. Consequently, wear debris generation can increase. In many cases, the higher temperatures will be the limiting factor on the worm drive before the loading limitations are reached. The load distribution of enveloping gear designs can lessen this problem, but the challenge still persists. Also, because of the sliding nature of the worm drive, metals with a low coefficient of friction are generally used. The worm wheel typically contains yellow metals, while the worm is usually made

of steel. This results in more favorable wear characteristics, better loading ability and less heat generation not found in other metal combinations. Yellow metals like bronze that are used on the worm wheel can present unique lubrication challenges when selecting a compatible additive package. With this metallurgical combination, it is also expected that the worm wheel act sacrificially in comparison to the worm due to the relative effort and costs in worm drive rebuilds. Lubrication Solutions Gearing designs and materials have been modernized through the years to achieve better load-carrying capability, higher torque conversions and improved longevity. Sophisticated testing platforms and computerized methods have provided a better understanding of common worm drive failure modes and offered clues for optimizing the solutions. Lubricants are no exception to these enhancements for worm drives. Generally speaking, a high-quality worm drive lubricant will have low friction, high oxidation resistance, good anti-wear protection and high viscosity index. The Right Base Oil While using lubricants formulated with mineral oil is quite common within worm drives, employing synthetic base oils generally results in improved gear efficiency and lower operating temperatures. Figure 5 illustrates lubricant life and oil change interval expectations for polyalphaolefins PAOs , polyalkylene glycols PAGs and mineral oils over a range of oil sump temperatures. This is supported by the Arrhenius Rate Rule, which states that for every increase of 10 degrees C in the average oil temperature, the chemical reactions double. Figure 6 specifies the improved efficiency when choosing a synthetic over a mineral oil, particularly PAGs, which have an inherently low coefficient of friction. PAGs are also known to reduce operating temperatures and total losses. Additional comparisons between mineral and PAG base oils are seen in Figure 7. PAGs do have some drawbacks, most notably their higher costs. They also are not compatible with some seal materials, plastics and paint coatings, so always confirm compatibility when switching to PAGs.

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Chapter 6 : Worm drive - Wikipedia

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Load Capacity The load capacity of the jack is limited by the physical constraints of the components drive sleeve, lift shaft, bearings, etc. All types of anticipated loads must be calculated, and be within the rated capacity of the jack. These loads can include: Appropriate design should also be made for shock loads, and should not exceed the rated capacity of the jack. Duty Cycle Duty cycle is the percentage of time on as opposed to total time. Anything that reduces or increases the generated heat increases or decreases duty cycle accordingly. Horsepower Ratings Horsepower values are influenced by many application-specific variables including mounting, environment, duty cycle and lubrication. The best way to determine whether performance is within horsepower limits is to measure the jack temperature. Special consideration should be given for multiple jack arrangements, as total horsepower required depends on horsepower per jack, number of jacks, the efficiency of the gear box or boxes and the efficiency of the arrangement. If needed horsepower exceeds the maximum for the jack selected, several solutions are possible: Column Strength Column Strength is the ability of the lift shaft to hold compressive loads without buckling. With longer screw lengths, column strength can be substantially lower than nominal jack capacity. If there is any possibility for the lift shaft to go into compression, the application should be sized for sufficient column strength. Designers should also be aware of effects of side loading. Jacks operating horizontally with long lift shafts can experience bending from the weight of the screw. If column strength is exceeded, there are several options: Critical Speed The speed that excites the natural frequency of the screw is referred to as the critical speed. The critical speed will vary with the diameter, unsupported length, end fixity and rpm of the screw. Because of the nature of most screw jack applications, critical speed is often overlooked. However, with longer travels, critical speed should be a major factor in determining the appropriate size jack. Worm gear jacks are designed to provide thrust only and a guidance system should be designed to absorb all loads other than thrust. Preferred systems include hardened ground round shafting or square profile rail. Brakemotor Sizing To ensure safety, a brakemotor is recommended for worm gear jack screws where there is the possibility of injury. Horsepower requirements will determine the size of the motor, and once selected, verify that the standard brake has sufficient torque to both stop and hold the load. Ball Screw Life A major benefit of the use of ball screw jacks is the ability to predict the theoretical life of the ball screw, and all major manufacturers will provide life charts for their products. Once these factors are understood and accounted for, and paired with the features and benefits of Machine and Ball Screw Jacks, selecting the right one for your application should be considerably easier. Shares 0 ball screw jacks ball screw life brake motor brakemotor column strength for jacks critical speed for jacks design considerations design constraints for worm gear jacks duty cycle in linear motion horsepower in linear motion horsepower ratings load capacity machine screw jacks type of guidance worm gear screw jacks Post navigation.

Chapter 7 : Worm Gearboxes And Helical Gearboxes Selection - Power Jack Motion

The geometry of a worm gear is similar to that of a helical gear, except that the modifying the design to give predominantly "recess action" i.e. the.

What Can Power Jack Motion do? Power Jack Motion Group supplies motion control products for industrial automation and smart home appliances. Our core product line includes electric motors, linear actuators , worm gearboxes and planetary gearboxes. We have BLDC pump and blower fan product line as well. As we are China based, we have the advantage of extensive resources, good quality, and competitive price. Thus, we can help our clients make more profit and explore new market opportunities. We have listed the main OEM steps to help you learn how we make the customized products. Which are the business product lines for OEM services? Presently, we can produce custom-made electric motors, linear actuators, and gearboxes for your special projects. Several clients ask us to make custom-made brush motors for their machines. Are the samples free? For a first-time deal, you need to pay for sample cost, it will be deducted from your next order. Worm Drive Definition A worm drive is one simple worm gear set mechanism in which a worm meshes with a worm gear. Even it is simple, there are two important elements: They are also called the worm and worm wheel The worm and worm wheel is important motion control component providing large speed reductions. It can reduce the rotational speed or increase the torque output. The worm drive motion advantage is that they can transfer motion in right angle. It also has an interesting property: This worm drive self-locking feature let the worm gear has a brake function in conveyor systems or lifting systems. An Introduction to Worm Gearbox The most important applications of worm gears is used in worm gear box. A worm gearbox is called a worm reduction gearbox, worm gear reducer or a worm drive gearbox. It consists of worm gears, shafts, bearings, and box frames. The worm gear, shafts, bearings load are supported by the box shell. So, the gearbox housing must have sufficient hardness. Otherwise, it will result in lower transmission quality. As the worm gearbox comes with a durable, transmission ratio, small size, self-locking capability, and simple structure, it is often used across a wide range of industries: Rotary table or turntable, material dosing systems, auto feed machinery, stacking machine, belt conveyors, farm picking lorries and more automation industry. The worm gear manufacturing process is also relatively simple. The worm gear drive efficiency mostly depend on the helix angle of the worm. Usually, multiple thread worms and gears is more efficient than single thread worms. Proper thread worms can increase efficiency. To choose a brand lubricating oil is an essential factor to improve worm gearbox efficiency. As the proper lubrication can reduce worm gear action friction and heat. For worm shaft, the material should be hardened steel. The worm gear material should be aluminium bronze. By reducing the worm gear hardness, the friction on the worm teeth is reduced. In worm manufacturing, to use the specialized machine for gear cutting and tooth grinding of worms also can increase worm gearbox efficiency. From a large transmission gearbox power to an even small worm gearbox load, you can choose one from a wide range of worm reducer that precisely fits your application requirements.

Chapter 8 : Worm Gear Reducers, Worm Gearbox Manufacturers

It may be conventional wisdom that using a helical gearbox design will lead to more system efficiency than using a worm gear design. However, advances in worm gearbox design as well as improvements in lubrication are closing the efficiency gap to the point where the cost-effectiveness of worm.

Chapter 9 : Precision Mechanical Gear & Small Components Manufacturer | PIC Design, Inc.

A worm gear is a non-parallel, non-intersecting axis design consisting primarily of two gear elements: the worm, which is the driving gear in the shape of a spiral or screw, and the worm gear or worm wheel, which is the driven gear in the shape of a common spur gear.