



# COMMERCIAL GEAR & SPROCKET COMPANY, INC.

Call us at (800) 491-1073 and ask for Design Support \* [commercialgear.com](http://commercialgear.com)

## WORM GEARS

TO GET	HAVING	RULE	FORMULA
Linear pitch (circular axial)	Lead & number of threads in worm	Divide the lead by the no. of threads in worm	$P_x = L / N_w$
Normal diametral pitch	Axial diametral pitch & worm gear helix angle	Divide the axial diametral pitch by the cosine of the work helix angle	$P_{nd} = P_{xd} / \cos. \Psi$
Axial diametral pitch	Normal diametral pitch & worm helix angle	Multiple normal diametral pitch by the cosine of the worm helix angle	$P_{xd} = P_{nd} \cos. \Psi$
	No. of teeth in wormwheel & pitch diameter of wormwheel	Multiply the no. of teeth in the wormwheel by pitch diameter of the wormwheel	$P_{xd} = N_g / D$
Helix angle of worm	Worm pitch diameter & lead	Multiply the worm pitch diameter by $\pi$ and divide the product by the lead. The quotient is the co-tangent of the helix angle of the worm.	$\text{CoTan}\Psi = \pi * D_w / L$
	Normal	Divide the axial	$\cos\Psi = P_{xd} /$

	diametral pitch and axial diametral pitch	diametral pitch by the normal diametral pitch	Pnd
Pitch diameter of worm	Pitch diameter of wormwheel and center distance	Subtract the pitch diameter of the wormwheel from twice the center distance	$D_w = 2C - D_G$
	Outside diameter and addendum	Subtract twice the addendum from the outside diameter	$D_w = D - 2\alpha$
Pitch diameter of wormwheel	Linear pitch and number of teeth Pitch diameter of worm and center distance	Multiply the number of teeth in the wheel by the linear pitch of the worm, then divide by $\pi$  Divide the worm pitch diameter by 2 minus the center distance, multiplied by 2	$D_G = N_G * P_G / \pi$  $D_G = C * 2 - D_w$
Center distance between worm and wormwheel	Pitch diameter of worm and wormwheel	Add pitch diameter of worm and wormwheel, then divide the sum by 2	$C = D_{wt} * D_G / 2$
Addendum of worm tooth	Linear Pitch	Multiply the pitch by 0.318	$\alpha = .3183 * P_x$
Whole depth of worm tooth	Linear pitch	Multiply linear pitch by 0.6866	$W = 0.6866 * P$
Bottom diameter of worm	Whole depth and O.D.	Subtract twice the whole depth of tooth from the outside	$B = O - 2(WD)$

		diameter	
End width of thread tool	Linear pitch	Multiply the linear pitch by .31	$T = 0.31 * P$
Throat diameter of worm wheel	Wormwheel P.D. and worm addendum	Add twice the addendum of the worm tooth to the pitch diameter of the wormwheel	$O'' = D * 2S$
Radius of worm wheel throat	Worm O.D. and addendum	Subtract the addendum of the worm tooth from half the outside diameter of the worm	$U = O / 2 - 2(ADD)$
Outside diameter of worm	Pitch diameter and addendum	Add together the pitch diameter and two times the addendum	$O = D_1 + 2(ADD)$
Diameter of worm wheel to sharp corners	Radius of curvature face angle and throat diameter	Multiply the radius curvature of the wormwheel throat by the cosine of half the face angle. Subtract this quantity from the radius of curvature, multiply the remainder by 2. Then add the product to the wormwheel throat diameter.	$O = 2U - ux \cos A + O'$
Wormwheel helix angle	Worm lead and circumference of the pitch circle	Divide the lead of the worm by the	$\tan(HA) = L / D_1$

	of worm	circumference of the pitch circle. The result will be the tangent of the angle.	
Lead of worm	Linear pitch and number of threads in worm	Multiply the linear pitch by the number of threads in worm	$L = P_x * N_w$
Worm PD	Lead and helix angle of worm	Divide the lead of worm by the tangent of the helix angle then divide by $\pi$	$D_w = (L / \tan \Psi) / \pi$
Lead of worm	Worm Pd and helix angle of worm	Multiply the worm PD by $\pi$ then multiply by the tangent of the helix angle	$L = D_w * \pi \tan \Psi$
Number of threads in worm	Lead and axial circular pitch	Divide the lead by the axial circular pitch	$N_w = L / P_x$
	Number of teeth in wormwheel and ratio	Divide the number of teeth in the wormwheel by the ratio	$N_w = N_g / mG$
Number of teeth in wormwheel	Ratio and number of threads in wheel	Multiply the number of teeth in the worm by ratio	$N_g = mG * N_w$
Ratio	Number of teeth in wormwheel and number of threads in worm	Divide the number of teeth in the wormwheel by the number of teeth in the worm	$mG = N_g / N_w$

#### **DISCLAIMER AND LIMITED LIABILITY**

Commercial Gear and Sprocket Company, Inc. has provided this Designers & Engineers Resource in an effort to help you conceptualize your design. Due to the complex nature of designing and its interaction with an assortment of components, Commercial Gear and Sprocket Company, Inc. does not warrant that the usage of this site and the information therein is completely error free or fit for your specific design. Commercial Gear and Sprocket Company, Inc. makes no warranties, express or implied, with respect to the usage of the information provided or as to its fitness for any particular purpose. Commercial Gear and Sprocket Company, Inc. shall not be liable for any damage or loss of any kind, whether direct or indirect, incidental or consequential, regardless of whether such liability is based in Tort, Contract or otherwise including without limitation damages for loss of business, business profits, business interruption, or any other pecuniary loss arising out of or relating to the use of this site. **Commercial Gear and Sprocket Company, Inc. is however, standing by to assist you or design and fabricate to your specifications. Our third generation family owned company has been producing quality gears and other power transmission products at competitive prices since 1946. Call us at (800) 491-1073 and ask for Design Support**