

1	A speed reducer unit is to be designed for an input of 1.1 kW with transmission ratio 27. The speed of hardened steel worm is 1440 rpm. The worm wheel is to be made from phosphor bronze. The tooth form is to be 200 involute. Take center distance between worm and worm wheel = $x = 100$ mm. worm is double start.
2	A two tooth right hand worm transmits 2 kW at 2950 rpm to a 32 tooth worm gear. The worm gear is of 4 mm module, 20° pressure and a face width of 30 mm. The worm is of pitch diameter of 50 mm with a face width of 65 mm. The worm is made of steel case carburized OQ and T and ground. The worm gear is made of phosphor bronze. (a) Find the centre distance, the lead and the lead angle. (b) Find the bearing reactions on the worm gear and worm shaft and the torque output. (c) Find the efficiency.
3	Design a worm gear set to deliver 12 kW from a shaft rotating at 1500 rpm to another rotating at 75 rpm.
4	A worm gear rotating at 950 rpm transmits 4.5 kW. The pitch diameter of worm is 80mm while it is supported in bearing 350 mm apart. Calculate the maximum bending moment, the bending stress, the axial stress and the shearing stress in worm shaft. Helix angle is 7° , co-efficient of friction between worm and gear = 0.078. The pressure angle in axial section is 20° .
5	A closed worm gear drive is required to transmit the power of 4.5 kW with velocity ratio of 35. The driving shaft rotates at 950 rpm. The worm is made of medium carbon steel which is heat treated to a surface hardness of RC 50. The wheel rim is made of bronze (90% Cu, 10% Sn, $\sigma_u=250$ MPa). Design the gear drive for $z_1=1$ and 2.