



Design of Bevel Gears Formulas

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List of 20 Design of Bevel Gears Formulas











9) Radius of Pinion at Midpoint along Face Width for Bevel Gear 💪

fx
$$\mathbf{r}_{m} = \frac{\mathbf{D}_{p} - (\mathbf{b} \cdot \sin(\gamma))}{2}$$

ex $23.09456 \text{mm} = \frac{76.5 \text{mm} - (35 \text{mm} \cdot \sin(60^{\circ}))}{2}$
10) Radius of Pinion at Midpoint given Torque and Tangential Force for Bevel Gear \mathbf{C}





13) Material Constant for Bevel Gear Wear Strength 🕑

$$\mathbf{K} = \frac{\sigma_{c}^{2} \cdot \sin(\alpha_{Bevel}) \cdot \cos(\alpha_{Bevel}) \cdot \left(\frac{1}{E_{p}} + \frac{1}{E_{g}}\right)}{1.4}$$

$$\mathbf{K} = \frac{\sigma_{c}^{2} \cdot \sin(\alpha_{Bevel}) \cdot \cos(\alpha_{Bevel}) \cdot \left(\frac{1}{E_{p}} + \frac{1}{E_{g}}\right)}{1.4}$$

$$\mathbf{K} = \frac{\sigma_{c}^{2} \cdot \sin(\alpha_{Bevel}) \cdot \cos(\alpha_{Bevel}) \cdot \left(\frac{1}{E_{p}} + \frac{1}{E_{g}}\right)}{1.4}$$

14) Material Constant for Bevel Gear Wear Strength given Brinell Hardness Number

fx
$$\mathbf{K} = 0.16 \cdot \left(rac{\mathrm{BHN}}{100}
ight)^2$$

ex
$$2.509056 \mathrm{N/mm^2} = 0.16 \cdot \left(rac{396}{100}
ight)^2$$

15) Wear Strength of Bevel Gear by Buckingham's Equation 🕑

fx
$$\mathbf{S}_{\mathrm{w}} = rac{0.75 \cdot \mathbf{b} \cdot \mathbf{Q}_{\mathrm{b}} \cdot \mathbf{D}_{\mathrm{p}} \cdot \mathbf{K}}{\cos(\gamma)}$$

ex 15060.94N = $\frac{0.75 \cdot 35$ mm $\cdot 1.5 \cdot 76.5$ mm $\cdot 2.5$ N/mm² $\cos(60^{\circ})$





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$$0.75 = \frac{0}{6 + 2\mathrm{m/s}}$$



20) Velocity Factor for Generated Teeth of Bevel Gear 🕑

fx
$$C_{v \text{ gen}} = \frac{5.6}{5.6 + \sqrt{v}}$$

ex $0.798379 = \frac{5.6}{5.6 + \sqrt{2m/s}}$





Variables Used

- a Geometric Step Ratio
- A₀ Cone Distance (Millimeter)
- **b** Face Width of Bevel Gear Tooth (Millimeter)
- Bf Bevel Factor
- BHN Brinell Hardness Number for Bevel Gear
- C_{v cut} Velocity Factor for Cut Teeth
- Cv gen Velocity Factor for Generated Teeth
- **D**_q Pitch Circle Diameter of Gear (Millimeter)
- Dp Pitch Circle Diameter of Bevel Pinion (Millimeter)
- Eg Modulus of Elasticity of Spur Gear (Newton per Square Millimeter)
- Ep Modulus of Elasticity of Spur Pinion (Newton per Square Millimeter)
- K Material Constant (Newton per Square Millimeter)
- LL Minimum Dimension/Rating of Product (Millimeter)
- **m** Module of Bevel Gear (Millimeter)
- Mt Torque Transmitted by Bevel Pinion (Newton Millimeter)
- **n** Quantity of Product
- N Speed of Rotation (1 per Second)
- Pa Axial or Thrust Component on Bevel Gear (Newton)
- Pr Radial Force on Bevel Gear (Newton)
- Pt Tangential Force Transmitted by Bevel Gear (Newton)
- **Q**_b Ratio Factor for Bevel Gear
- R Range Ratio in Preferred Series
- **r**_b Back Cone Radius (Millimeter)
- **r**_m Radius of Pinion at Midpoint (Millimeter)
- Sb Beam Strength of Bevel Gear Teeth (Newton)

- S_w Wear Strength of Bevel Gear Tooth (Newton)
- UL Maximum Dimension/Rating of Product (Millimeter)
- V Pitch Line Velocity of Bevel Gear (Meter per Second)
- Wshaft Shaft Power (Kilowatt)
- Y Lewis Form Factor
- **Z**q Number of Teeth on Bevel Gear
- Zp Number of Teeth on Pinion
- z Virtual Number of Teeth for Bevel Gear
- α_{Bevel} Pressure Angle (Degree)
- γ Pitch Angle for Bevel Gear (Degree)
- σ_b Bending Stress in Bevel Gear Teeth (Newton per Square Millimeter)
- σ_c Compressive Stress in Bevel Gear Tooth (Newton per Square Millimeter)
- T Torque Applied (Newton Millimeter)



Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- Function: **cos**, cos(Angle) Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Function: sin, sin(Angle) Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Function: sqrt, sqrt(Number) A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Function: tan, tan(Angle) The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.
- Measurement: Length in Millimeter (mm) Length Unit Conversion
- Measurement: Pressure in Newton per Square Millimeter (N/mm²) Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s) Speed Unit Conversion
- Measurement: Power in Kilowatt (kW) Power Unit Conversion
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Angle in Degree (°) Angle Unit Conversion
- Measurement: Torque in Newton Millimeter (N*mm) Torque Unit Conversion
- Measurement: Vorticity in 1 per Second (1/s) Vorticity Unit Conversion





• Measurement: Stress in Newton per Square Millimeter (N/mm²) Stress Unit Conversion



Check other formula lists

- Design of Bevel Gears Formulas C
- Design of Helical Gears Formulas G

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