calculatoratoz.com

unitsconverters.com

Design of Flywheel Formulas

Calculators! Examples! Conversions!

List of 21 Design of Flywheel Formulas

Design of Flywheel

1) Coefficient of Fluctuation of Flywheel Energy given Maximum Fluctuation of Flywheel Energy

Open Calculator

fx $$C_e = \frac{U_0}{W}$$

ex $$1.93 = \frac{791.3\text{J}}{410\text{J}}$$

2) Coefficient of Fluctuation of Flywheel Speed given Mean Speed

Open Calculator

fx $$C_s = \frac{n_{max} - n_{min}}{\omega}$$

ex $$0.2 = \frac{314.6\text{rev/min} - 257.4\text{rev/min}}{286\text{rev/min}}$$

3) Coefficient of Fluctuation of Flywheel Speed given Min and Max Speed

Open Calculator

fx $$C_s = 2 \cdot \frac{n_{max} - n_{min}}{n_{max} + n_{min}}$$

ex $$0.2 = 2 \cdot \frac{314.6\text{rev/min} - 257.4\text{rev/min}}{314.6\text{rev/min} + 257.4\text{rev/min}}$$

4) Coefficient of Steadiness of Flywheel given Mean Speed

Open Calculator

fx $$m = \frac{\omega}{n_{max} - n_{min}}$$

ex $$5 = \frac{286\text{rev/min}}{314.6\text{rev/min} - 257.4\text{rev/min}}$$

5) Energy Output from Flywheel

Open Calculator

$$U_o = I \cdot \omega^2 \cdot C_s$$

$$779.2631\text{J} = 4343750\text{kg*mm}^2 \cdot (286\text{rev/min})^2 \cdot 0.2$$

6) Mass Density of Flywheel Disk

Open Calculator

$$\rho = \frac{2 \cdot I}{\pi \cdot t \cdot R^4}$$

$$7800.001\text{kg/m}^3 = \frac{2 \cdot 4343750\text{kg*mm}^2}{\pi \cdot 25.02499\text{mm} \cdot (345\text{mm})^4}$$

7) Maximum Fluctuation of Flywheel Energy given Coefficient of Fluctuation of Enaergy

Open Calculator

$$U_0 = C_e \cdot W$$

$$791.3\text{J} = 1.93 \cdot 410\text{J}$$

8) Maximum Radial or Tensile Stress in Flywheel

Open Calculator

$$\sigma_{t,max} = \rho \cdot V_p^2 \cdot \left(\frac{3 + u}{8}\right)$$

$$0.344667\text{N/mm}^2 = 7800\text{kg/m}^3 \cdot (10.35\text{m/s})^2 \cdot \left(\frac{3 + 0.3}{8}\right)$$

9) Mean Angular Velocity of Flywheel

Open Calculator

$$\omega = \frac{n_{max} + n_{min}}{2}$$

$$286\text{rev/min} = \frac{314.6\text{rev/min} + 257.4\text{rev/min}}{2}$$

10) Mean Torque of Flywheel for Four Stroke Engine

Open Calculator

fx $$T_{m\ FS} = \frac{W}{4 \cdot \pi}$$

ex $$32626.76\text{N*mm} = \frac{410\text{J}}{4 \cdot \pi}$$

11) Mean Torque of Flywheel for Two Stroke Engine

Open Calculator

fx $$T_{m\ TS} = \frac{W}{2 \cdot \pi}$$

ex $$65253.53\text{N*mm} = \frac{410\text{J}}{2 \cdot \pi}$$

12) Moment of Inertia of Flywheel

Open Calculator

fx $$I = \frac{T_1 - T_2}{\alpha}$$

ex $$4.3\text{E\^{}6kg*mm}^2 = \frac{20850\text{N*mm} - 13900\text{N*mm}}{1.6\text{rad/s}^2}$$

13) Moment of Inertia of Flywheel Disk

Open Calculator

fx $$I = \frac{\pi}{2} \cdot \rho \cdot R^4 \cdot t$$

ex $$4.3\text{E\^{}6kg*mm}^2 = \frac{\pi}{2} \cdot 7800\text{kg/m}^3 \cdot (345\text{mm})^4 \cdot 25.02499\text{mm}$$

14) Outer Radius of Flywheel Disk

Open Calculator

fx $$R = \left(\frac{2 \cdot I}{\pi \cdot t \cdot \rho}\right)^{\frac{1}{4}}$$

ex $$345\text{mm} = \left(\frac{2 \cdot 4343750\text{kg*mm}^2}{\pi \cdot 25.02499\text{mm} \cdot 7800\text{kg/m}^3}\right)^{\frac{1}{4}}$$

15) Radial Stress in Rotating Flywheel at given Radius

Open Calculator

fx $$\sigma_r = \rho \cdot V_p^2 \cdot \left(\frac{3+u}{8}\right) \cdot \left(1 - \left(\frac{r}{R}\right)^2\right)$$

ex $$0.228837\text{N/mm}^2 = 7800\text{kg/m}^3 \cdot (10.35\text{m/s})^2 \cdot \left(\frac{3+0.3}{8}\right) \cdot \left(1 - \left(\frac{200\text{mm}}{345\text{mm}}\right)^2\right)$$

16) Tangential Stress in Rotating Flywheel at given Radius

Open Calculator

fx $$\sigma_t = \rho \cdot V_p^2 \cdot \frac{u+3}{8} \cdot \left(1 - \left(\frac{3 \cdot u + 1}{u+3}\right) \cdot \left(\frac{r}{R}\right)^2\right)$$

ex $$0.277977\text{N/mm}^2 = 7800\text{kg/m}^3 \cdot (10.35\text{m/s})^2 \cdot \frac{0.3+3}{8} \cdot \left(1 - \left(\frac{3 \cdot 0.3 + 1}{0.3+3}\right) \cdot \left(\frac{200\text{mm}}{345\text{mm}}\right)^2\right)$$

17) Tensile Stress in Spokes of Rimmed Flywheel

Open Calculator

fx $$\sigma t_s = \frac{P}{b_{rim} \cdot t_r} + \frac{6 \cdot M}{b_{rim} \cdot t_r^2}$$

ex $$25\text{N/mm}^2 = \frac{1500\text{N}}{15\text{mm} \cdot 16\text{mm}} + \frac{6 \cdot 12000\text{N*mm}}{15\text{mm} \cdot (16\text{mm})^2}$$

18) Thickness of Flywheel Disk

Open Calculator

fx $$t = \frac{2 \cdot I}{\pi \cdot \rho \cdot R^4}$$

ex $$25.02499\text{mm} = \frac{2 \cdot 4343750\text{kg*mm}^2}{\pi \cdot 7800\text{kg/m}^3 \cdot (345\text{mm})^4}$$

19) Work Done per Cycle for Engine connected to Flywheel

Open Calculator

$$W = \frac{U_0}{C_e}$$

$$410\text{J} = \frac{791.3\text{J}}{1.93}$$

20) Work Done per Cycle for Four Stroke Engine connected to Flywheel

Open Calculator

$$W = 4 \cdot \pi \cdot T_{m\ FS}$$

$$410\text{J} = 4 \cdot \pi \cdot 32626.76\text{N*mm}$$

21) Work Done per Cycle for Two Stroke Engine connected to Flywheel

Open Calculator

$$W = 2 \cdot \pi \cdot T_{m\ TS}$$

$$410\text{J} = 2 \cdot \pi \cdot 65253.53\text{N*mm}$$

Variables Used

- b_{rim} Width of Rim of Flywheel *(Millimeter)*
- C_e Coefficient of Fluctuation of Flywheel Energy
- C_s Coefficient of Fluctuation of Flywheel Speed
- I Moment of Inertia of Flywheel *(Kilogram Square Millimeter)*
- m Coefficient of Steadiness for Flywheel
- M Bending Moment in Flywheel Spokes *(Newton Millimeter)*
- n_{max} Maximum Angular Speed of Flywheel *(Revolution per Minute)*
- n_{min} Minimum Angular Speed of Flywheel *(Revolution per Minute)*
- P Tensile Force in Flywheel Rim *(Newton)*
- r Distance from Flywheel Centre *(Millimeter)*
- R Outer Radius of Flywheel *(Millimeter)*
- t Thickness of Flywheel *(Millimeter)*
- T_1 Driving Input Torque of Flywheel *(Newton Millimeter)*
- T_2 Load Output Torque of Flywheel *(Newton Millimeter)*
- $T_{m\ FS}$ Mean Torque of Flywheel for Four Stroke Engine *(Newton Millimeter)*
- $T_{m\ TS}$ Mean Torque of Flywheel for Two Stroke Engine *(Newton Millimeter)*
- t_r Thickness of Rim of Flywheel *(Millimeter)*
- u Poisson Ratio for Flywheel
- U_0 Maximum Fluctuation of Energy for Flywheel *(Joule)*
- U_o Energy Output From Flywheel *(Joule)*
- V_p Peripheral Speed of Flywheel *(Meter per Second)*
- W Work Done per Cycle for Engine *(Joule)*
- α Angular Acceleration of Flywheel *(Radian per Square Second)*
- ρ Mass Density of Flywheel *(Kilogram per Cubic Meter)*
- σ_r Radial Stress in Flywheel *(Newton per Square Millimeter)*
- σ_t Tangential Stress in Flywheel *(Newton per Square Millimeter)*
- $\sigma_{t,max}$ Maximum Radial Tensile Stress in Flywheel *(Newton per Square Millimeter)*
- σt_s Tensile Stress in Spokes of Flywheel *(Newton per Square Millimeter)*
- ω Mean Angular Speed of Flywheel *(Revolution per Minute)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Angular Velocity** in Revolution per Minute (rev/min)
  Angular Velocity Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m³)
  Density Unit Conversion
- Measurement: **Torque** in Newton Millimeter (N*mm)
  Torque Unit Conversion
- Measurement: **Moment of Inertia** in Kilogram Square Millimeter (kg*mm²)
  Moment of Inertia Unit Conversion
- Measurement: **Moment of Force** in Newton Millimeter (N*mm)
  Moment of Force Unit Conversion
- Measurement: **Angular Acceleration** in Radian per Square Second (rad/s²)
  Angular Acceleration Unit Conversion
- Measurement: **Stress** in Newton per Square Millimeter (N/mm²)
  Stress Unit Conversion

Check other formula lists

- **Design of Flywheel Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

10/15/2024 | 9:47:47 AM UTC *Please leave your feedback here...*