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Velocity Ratio Formulas

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List of 10 Velocity Ratio Formulas

Velocity Ratio

1) Peripheral Velocity of Driving Pulley

Open Calculator

fx $$V = \pi \cdot d_d \cdot N_d$$

ex $$4.300107\text{m/s} = \pi \cdot 0.011\text{m} \cdot 7466\text{rev/min}$$

2) Peripheral Velocity of Follower Pulley

Open Calculator

fx $$V = \pi \cdot d_f \cdot N_f$$

ex $$4.300003\text{m/s} = \pi \cdot 0.014\text{m} \cdot 5866\text{rev/min}$$

3) Velocity Ratio

Open Calculator

fx $$i = \frac{T_d}{T_{dr}}$$

ex $$0.78 = \frac{15.6}{20}$$

4) Velocity Ratio of Belt Drive

Open Calculator

fx $$i = \frac{N_f}{N_d}$$

ex $$0.785695 = \frac{5866\text{rev/min}}{7466\text{rev/min}}$$

5) Velocity Ratio of Belt given Creep of Belt

Open Calculator

$$i = \frac{d_d \cdot \left(E + \sqrt{\sigma_2}\right)}{d_f \cdot \left(E + \sqrt{\sigma_1}\right)}$$

$$0.785761 = \frac{0.011\text{m} \cdot \left(10000\text{N/m}^2 + \sqrt{8\text{N/m}^2}\right)}{0.014\text{m} \cdot \left(10000\text{N/m}^2 + \sqrt{5\text{N/m}^2}\right)}$$

6) Velocity Ratio of Belt given Total Percentage Slip

Open Calculator

$$i = (d_d + t) \cdot \frac{1 - 0.01 \cdot s}{d_f + t}$$

$$0.783935 = (0.011\text{m} + 9\text{E}\hat{}\text{-5m}) \cdot \frac{1 - 0.01 \cdot 0.4}{0.014\text{m} + 9\text{E}\hat{}\text{-5m}}$$

7) Velocity Ratio of Compound Belt Drive

Open Calculator

$$i = \frac{N_n}{N_{d\prime}}$$

$$0.785714 = \frac{22\text{rev/min}}{28\text{rev/min}}$$

8) Velocity Ratio of Compound Belt Drive given Product of Diameter of Driven

Open Calculator

fx $$i = \frac{P_1}{P_2}$$

ex $$0.78 = \frac{46.8}{60}$$

9) Velocity Ratio of Simple Belt Drive when Thickness Considered

Open Calculator

fx $$i = \frac{d_d + t}{d_f + t}$$

ex $$0.787083 = \frac{0.011\text{m} + 9\text{E}\hat{}\text{-}5\text{m}}{0.014\text{m} + 9\text{E}\hat{}\text{-}5\text{m}}$$

10) Velocity Ratio of Simple Belt Drive when Thickness Not Considered

Open Calculator

fx $$i = \frac{d_d}{d_f}$$

ex $$0.785714 = \frac{0.011\text{m}}{0.014\text{m}}$$

Variables Used

- d_d Diameter of Driver *(Meter)*
- d_f Diameter of Follower *(Meter)*
- **E** Young's Modulus of Belt *(Newton per Square Meter)*
- **i** Velocity Ratio
- N_d Speed of Driver *(Revolution per Minute)*
- $N_{d'}$ Speed of First Driver *(Revolution per Minute)*
- N_f Speed of Follower *(Revolution per Minute)*
- N_n Speed of Last Driven Pulley *(Revolution per Minute)*
- P_1 Product of Diameters of Drivers
- P_2 Product of Diameters of Drivens
- **s** Total Percentage of Slip
- **t** Belt Thickness *(Meter)*
- T_d Number of Teeth on Driven
- T_{dr} Number of Teeth on Driver
- **V** Peripheral Velocity of Pulley *(Meter per Second)*
- σ_1 Stress in Tight Side of Belt *(Newton per Square Meter)*
- σ_2 Stress in Slack Side of Belt *(Newton per Square Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- 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.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Pressure** in Newton per Square Meter (N/m²)
  Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Frequency** in Revolution per Minute (rev/min)
  Frequency Unit Conversion

Check other formula lists

- **Belt Drive Formulas**
- **Velocity Ratio Formulas**

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