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Turning Radius Formulas

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List of 19 Turning Radius Formulas

Turning Radius

1) Deceleration given Sight Distance

Open Calculator

fx $$d = \frac{V_{\text{Turning Speed}}^2}{25.5 \cdot SD}$$

ex $$32.67974\text{m}^2/\text{s} = \frac{(50\text{km/h})^2}{25.5 \cdot 3\text{m}}$$

2) Deflection Angle of Entrance Curve

Open Calculator

fx $$D_1 = \frac{180 \cdot L_1}{\pi \cdot R_{\text{Taxiway}}}$$

ex $$21.72915\text{rad} = \frac{180 \cdot 20.1\text{m}}{\pi \cdot 53\text{m}}$$

3) Deflection Angle of Entrance Curve given Deflection of Angle at Central Curve

Open Calculator

fx $$D_1 = 35 - D_2$$

ex $$21\text{rad} = 35 - 14\text{rad}$$

4) Deflection of Angle at Central Curve

Open Calculator

fx $$D_2 = 35 - D_1$$

ex $$14\text{rad} = 35 - 21\text{rad}$$

5) Deflection of Angle at Central Curve when Length of Central Curve is considered

Open Calculator

fx $$D_2 = \frac{180 \cdot L2}{\pi \cdot R2}$$

ex $$14.09926\text{rad} = \frac{180 \cdot 25.1\text{m}}{\pi \cdot 102\text{m}}$$

6) Distance between Midway Points of Main Gears and Edge of Taxiway Pavements

fx

Open Calculator

$$D_{\text{Midway}} = (0.5 \cdot T_{\text{Width}}) - \left(0.388 \cdot \frac{W^2}{R_{\text{Taxiway}}}\right)$$

ex $$17.78968\text{m} = (0.5 \cdot 45.1\text{m}) - \left(0.388 \cdot \frac{(25.5\text{m})^2}{53\text{m}}\right)$$

7) Horonjeff Equation for Turning Radius of Taxiway

Open Calculator

$$\mathrm{R_{Taxiway}} = \frac{0.388 \cdot \mathrm{W}^2}{(0.5 \cdot \mathrm{T_{Width}}) - \mathrm{D_{Midway}}}$$

$$52.89245\mathrm{m} = \frac{0.388 \cdot (25.5\mathrm{m})^2}{(0.5 \cdot 45.1\mathrm{m}) - 17.78\mathrm{m}}$$

8) Length of Central Curve

Open Calculator

$$\mathrm{L2} = \frac{\pi \cdot \mathrm{R2} \cdot \mathrm{D_2}}{180}$$

$$24.9233\mathrm{m} = \frac{\pi \cdot 102\mathrm{m} \cdot 14\mathrm{rad}}{180}$$

9) Length of Entrance Curve when Deflection Angle of Entrance Curve is considered

Open Calculator

$$\mathrm{L_1} = \frac{\pi \cdot \mathrm{D_1} \cdot \mathrm{R_{Taxiway}}}{180}$$

$$19.42551\mathrm{m} = \frac{\pi \cdot 21\mathrm{rad} \cdot 53\mathrm{m}}{180}$$

10) Radius of Central Curve given Length of Central Curve

Open Calculator

$$\mathrm{R2} = \frac{180 \cdot \mathrm{L2}}{\pi \cdot \mathrm{D_2}}$$

$$102.7231\mathrm{m} = \frac{180 \cdot 25.1\mathrm{m}}{\pi \cdot 14\mathrm{rad}}$$

11) Radius of Curve when Velocity in Turn

Open Calculator

fx $$R_{Taxiway} = \left(\frac{V_{Turning\ Speed}}{4.1120} \right)^2$$

ex $$147.8542\text{m} = \left(\frac{50\text{km/h}}{4.1120} \right)^2$$

12) Radius of Entrance Curve when Deflection Angle of Entrance Curve is considered

Open Calculator

fx $$R_{Taxiway} = \frac{180 \cdot L_1}{\pi \cdot D_1}$$

ex $$54.84025\text{m} = \frac{180 \cdot 20.1\text{m}}{\pi \cdot 21\text{rad}}$$

13) Sight Distance

Open Calculator

fx $$SD = \frac{V_{Turning\ Speed}^2}{25.5 \cdot d}$$

ex $$3.007338\text{m} = \frac{(50\text{km/h})^2}{25.5 \cdot 32.6\text{m}^2/\text{s}}$$

14) Taxiway Width given Turning Radius

Open Calculator

fx $$T_{Width} = \frac{\left(\frac{0.388 \cdot W^2}{R_{Taxiway}}\right) + D_{Midway}}{0.5}$$

ex $$45.08064\text{m} = \frac{\left(\frac{0.388 \cdot (25.5\text{m})^2}{53\text{m}}\right) + 17.78\text{m}}{0.5}$$

15) Turning Radius

Open Calculator

fx $$R_{Taxiway} = \frac{V_{Turning\ Speed}^2}{125 \cdot \mu_{Friction}}$$

ex $$7.716049\text{m} = \frac{(50\text{km/h})^2}{125 \cdot 0.2}$$

16) Turning Speed of Aircraft given Radius of Curve

Open Calculator

fx $$V_{Turning\ Speed} = \sqrt{R_{Taxiway} \cdot \mu_{Friction} \cdot 125}$$

ex $$36.40055\text{km/h} = \sqrt{53\text{m} \cdot 0.2 \cdot 125}$$

17) Turning Speed of Aircraft given Sight Distance

Open Calculator

fx $$V_{Turning\ Speed} = \sqrt{25.5 \cdot d \cdot SD}$$

ex $$49.93896\text{km/h} = \sqrt{25.5 \cdot 32.6\text{m}^2/\text{s} \cdot 3\text{m}}$$

18) Velocity in Turn

Open Calculator

$$V_{\text{Turning Speed}} = 4.1120 \cdot R_{\text{Taxiway}}^{0.5}$$

$$107.7689\text{km/h} = 4.1120 \cdot (53\text{m})^{0.5}$$

19) Wheelbase given Turning Radius

Open Calculator

$$W = \sqrt{\frac{(R_{\text{Taxiway}} \cdot (0.5 \cdot T_{\text{Width}})) - D_{\text{Midway}}}{0.388}}$$

$$55.08592\text{m} = \sqrt{\frac{(53\text{m} \cdot (0.5 \cdot 45.1\text{m})) - 17.78\text{m}}{0.388}}$$

Variables Used

- **d** Deceleration *(Square Meter per Second)*
- **D_1** Deflection Angle of Entrance Curve *(Radian)*
- **D_2** Deflection Angle of Central Curve *(Radian)*
- **D_{Midway}** Distance between Midway Points *(Meter)*
- **L_1** Length of Entrance Curve *(Meter)*
- **L2** Length of Central Curve *(Meter)*
- **$R_{Taxiway}$** Radius of Curve for Taxiway *(Meter)*
- **R2** Radius of Central Curve *(Meter)*
- **SD** Sight Distance *(Meter)*
- **T_{Width}** Taxiway Width *(Meter)*
- **$V_{Turning\ Speed}$** Turning Speed of Aircraft *(Kilometer per Hour)*
- **W** Wheelbase *(Meter)*
- **$\mu_{Friction}$** Coefficient of Friction

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Speed** in Kilometer per Hour (km/h)
  Speed Unit Conversion
- Measurement: **Angle** in Radian (rad)
  Angle Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m²/s)
  Kinematic Viscosity Unit Conversion

Check other formula lists

- **Taxiway Design Formulas**
- **Turning Radius Formulas**

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