Important Engine-Out Takeoff Case under Estimation of Runway Length Formulas PDF

Formulas
Examples
with Units

List of 26
Important Engine-Out Takeoff Case under Estimation of Runway Length Formulas

1) Aborted Takeoff Formulas

1.1) Distance to Accelerate and Stop given Full Strength Pavement Distance Formula

Evaluate Formula

Formula	Example with Units
$DAS = FS + SW$	$2500\,\text{m} = 2000\,\text{m} + 500\,\text{m}$

1.2) Field Length or Total Amount of Runway needed Formula

Evaluate Formula

Formula	Example with Units
$FL = FS + SW$	$2500\,\text{m} = 2000\,\text{m} + 500\,\text{m}$

1.3) Full Strength Pavement Distance for Aborted Takeoff Formula

Evaluate Formula

Formula	Example with Units
$FS = DAS - SW$	$2000\,\text{m} = 2500\,\text{m} - 500\,\text{m}$

1.4) Full Strength Pavement Distance given Field Length Formula

Evaluate Formula

Formula	Example with Units
$FS = FL - SW$	$2100\,\text{m} = 2600\,\text{m} - 500\,\text{m}$

1.5) Stopway Distance given Field Length Formula

Evaluate Formula

Formula	Example with Units
$SW = FL - FS$	$600\,\text{m} = 2600\,\text{m} - 2000\,\text{m}$

1.6) Stopway Distance given Full Strength Pavement Distance Formula

Evaluate Formula

Formula	Example with Units
$SW = DAS - FS$	$500\,\text{m} = 2500\,\text{m} - 2000\,\text{m}$

2) Continued Takeoff Formulas

2.1) Clearway Distance for Continued Takeoff Formula

Evaluate Formula

Formula

$$CL = 0.5 \cdot \left(D_{35} - s_{LO} \right)$$

Example with Units

$$545\,\text{m} = 0.5 \cdot \left(1600\,\text{m} - 510\,\text{m} \right)$$

2.2) Clearway Distance given Field Length under Continued Takeoff Formula

Evaluate Formula

Formula

$$CL = FL - FS$$

Example with Units

$$600\,\text{m} = 2600\,\text{m} - 2000\,\text{m}$$

2.3) Clearway Distance given Takeoff Run Formula

Evaluate Formula

Formula

$$CL = D_{35} - T_{Clearway}$$

Example with Units

$$600\,\text{m} = 1600\,\text{m} - 1000\,\text{m}$$

2.4) Distance of 35 ft Obstacle given Takeoff Run Formula

Evaluate Formula

Formula

$$D_{35} = T_{Clearway} + CL$$

Example with Units

$$1600\,\text{m} = 1000\,\text{m} + 600\,\text{m}$$

2.5) Distance to clear 35 ft Obstacle for Clearway Distance for Continued Takeoff Formula

Evaluate Formula

Formula

$$D_{35} = \left(\frac{CL}{0.5} \right) + s_{LO}$$

Example with Units

$$1710\,\text{m} = \left(\frac{600\,\text{m}}{0.5} \right) + 510\,\text{m}$$

2.6) Field Length or Total Amount of Runway needed under Continued Takeoff Formula

Evaluate Formula

Formula

$$FL = FS + CL$$

Example with Units

$$2600\,\text{m} = 2000\,\text{m} + 600\,\text{m}$$

2.7) Liftoff Distance given Clearway Distance for Continued Takeoff Formula

Evaluate Formula

Formula

$$s_{LO} = -\left(\left(\frac{CL}{0.5} \right) - D_{35} \right)$$

Example with Units

$$400\,\text{m} = -\left(\left(\frac{600\,\text{m}}{0.5} \right) - 1600\,\text{m} \right)$$

2.8) Takeoff Run for Continued Takeoff Formula

Evaluate Formula

Formula

$$T_{Clearway} = D_{35} - CL$$

Example with Units

$$1000\,\text{m} = 1600\,\text{m} - 600\,\text{m}$$

3) Landing Distance under Estimation of Runway Length Formulas

3.1) Additional Distance required for Turns given Distance between Center lines Formula

Evaluate Formula

Formula

$$d_R = d - 116$$

Example with Units

$$34\,\text{m} = 150\,\text{m} - 116$$

3.2) Distance between Center Lines of Runway and Parallel Taxiway Formula

Evaluate Formula

Formula

$$d = 116 + d_R$$

Example with Units

$$150\,\text{m} = 116 + 34\,\text{m}$$

3.3) Equation for Landing Distance Formula

Evaluate Formula

Formula

$$LD = 1.667 \cdot SD$$

Example with Units

$$8.335\,\text{km} = 1.667 \cdot 5\,\text{km}$$

3.4) Stopping Distance given Landing Distance Formula

Evaluate Formula

Formula

$$SD = \frac{LD}{1.667}$$

Example with Units

$$5.9988\,\text{km} = \frac{10\,\text{km}}{1.667}$$

4) Normal Takeoff Cases under Estimation of Runway Length Formulas

4.1) Clearway Distance Formula

Evaluate Formula

Formula

$$CL = 0.5 \cdot \left(TOD - \left(1.15 \cdot s_{LO} \right) \right)$$

Example with Units

$$656.75\,\text{m} = 0.5 \cdot \left(1900\,\text{m} - \left(1.15 \cdot 510\,\text{m} \right) \right)$$

4.2) Clearway Distance given Field Length Formula

Evaluate Formula

Formula

$$CL = FL - FS$$

Example with Units

$$600\,\text{m} = 2600\,\text{m} - 2000\,\text{m}$$

4.3) Field Length Formula

Evaluate Formula

Formula

$$FL = FS + CL$$

Example with Units

$$2600\,\text{m} = 2000\,\text{m} + 600\,\text{m}$$

4.4) Full Strength Pavement Distance Formula

Evaluate Formula

Formula

$$FS = FL - CL$$

Example with Units

$$2000\,\text{m} = 2600\,\text{m} - 600\,\text{m}$$

4.5) Lift off Distance given Clearway Distance Formula

Evaluate Formula

Formula

$$s_{LO} = -\left(\frac{\left(\frac{CL}{0.5}\right) - TOD}{1.15}\right)$$

Example with Units

$$608.6957\,\text{m} = -\left(\frac{\left(\frac{600\,\text{m}}{0.5}\right) - 1900\,\text{m}}{1.15}\right)$$

4.6) Takeoff Distance given Clearway Distance Formula

Evaluate Formula

Formula

$$TOD = \left(\frac{CL}{0.5}\right) + \left(1.15 \cdot s_{LO}\right)$$

Example with Units

$$1786.5\,\text{m} = \left(\frac{600\,\text{m}}{0.5}\right) + \left(1.15 \cdot 510\,\text{m}\right)$$

4.7) Takeoff Distance given Takeoff Run Formula

Evaluate Formula

Formula

$$T_{Distance} = TOR + CL$$

Example with Units

$$3952\,\text{m} = 3352\,\text{m} + 600\,\text{m}$$

4.8) Takeoff Run Formula

Evaluate Formula

Formula

$$T_{Run} = TOD - CL$$

Example with Units

$$1300\,\text{m} = 1900\,\text{m} - 600\,\text{m}$$

Variables used in list of Engine-Out Takeoff Case under Estimation of Runway Length Formulas above

- **CL** Clearway Distance *(Meter)*
- **d** Distance between Centre lines *(Meter)*
- **D_{35}** Distance to Clear 35 ft Obstacle *(Meter)*
- **d_R** Additional Distance required for Turns *(Meter)*
- **DAS** Distance to Accelerate and Stop *(Meter)*
- **FL** Field Length *(Meter)*
- **FS** Full Strength Pavement Distance *(Meter)*
- **LD** Landing Distance *(Kilometer)*
- **s_{LO}** Liftoff Distance *(Meter)*
- **SD** Stopping Distance *(Kilometer)*
- **SW** Stopway Distance *(Meter)*
- **$T_{Clearway}$** Takeoff Run in Clearway *(Meter)*
- **$T_{Distance}$** Takeoff Distance given takeoff run *(Meter)*
- **T_{Run}** Takeoff Run given takeoff distance *(Meter)*
- **TOD** Takeoff Distance *(Meter)*
- **TOR** Takeoff Run *(Meter)*

Constants, Functions, Measurements used in list of Engine-Out Takeoff Case under Estimation of Runway Length Formulas above

- Measurement: **Length** in Meter (m), Kilometer (km)
  Length Unit Conversion

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