

## CE 563 Airport Design



### Aircraft Characteristics

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## Importance

- Aircraft weight
  - Pavement thickness
    - Runway, taxiway, apron
  - Runway length
    - Takeoff and landing distances
- Aircraft dimensions
  - Apron, terminal, runway and taxiway width
- Aircraft capacity
  - Terminal, parking, etc.

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## Turboprop Aircraft



SAAB 340



Beech 1900



EMB 120

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### Small Jet Aircraft



ERJ 145



CRJ 700



Bae-RJ100



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### Airbus Aircraft



A-320



A-319



A-340



A-330



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### Boeing Aircraft



B-717



B-737



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### Boeing Aircraft




B-757



B-767



B-777



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### Boeing 787



787 DREAMLINER



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### Boeing 747



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### Aircraft Characteristics

- Characteristics data varies
  - Engine performance
  - Operating weight
  - Altitude
  - Atmospheric conditions
- Aircraft design mostly focused on efficiency rather than aircraft size

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### Aircraft Characteristics

Aircraft	Wingspan	Length	MSTOW (lbs)	Runway Length (ft)
CRJ 700	76' 3"	106' 8"	72,750	5,800
B-717	107' 10"	152' 7"	156,000	6,800
A-320	111' 3"	123' 3"	158,730	5,700
B-737	112' 6"	124' 11"	172,445	6,000
B-747	213' 0"	231' 10"	800,000	8,800
A-380	261' 8"	239' 3"	1,235,000	10,000

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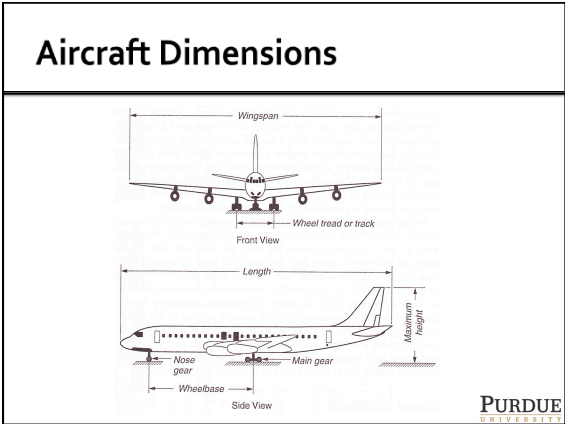
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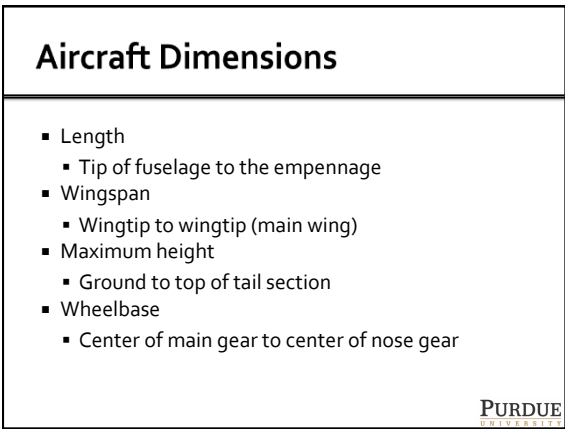
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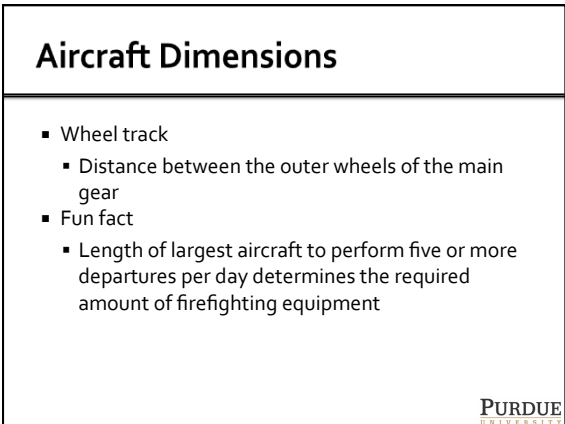
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### Turning Radius

- Function of:
  - Wheelbase
  - Wheel track
  - Steering angle
- Several different turning radii
  - Largest radius is critical for design




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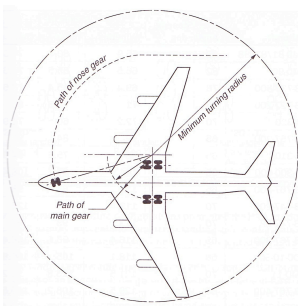
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### Turning Radius



Center of Rotation




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### Turning Radius

$$R_{180^\circ \text{ turn}} = b \tan(90 - \beta) + \frac{t}{2}$$

- $b$  = aircraft wheel base
- $T$  = aircraft wheel track
- $\beta$  = aircraft maximum steer angle




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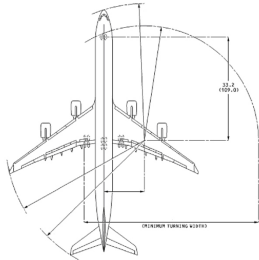
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### Turning Radius



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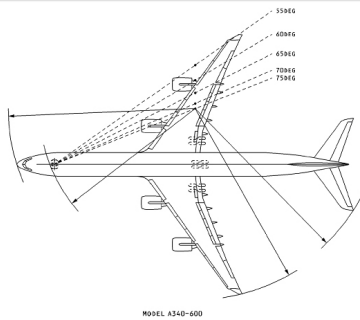
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### Turning Radius



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### Landing Gear Configurations

- Single wheel (S)
  - One wheel on each main gear strut
- Dual wheel (D)
  - Two wheels on each main gear strut
- Dual tandem (2D)
  - Two sets of wheels on each main gear strut

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### Landing Gear Configurations

The diagram illustrates three basic landing gear configurations: 1. 'S' Single wheel: A single wheel positioned centrally below the fuselage. 2. 'D' Dual wheel: Two wheels positioned side-by-side below the fuselage. 3. '2D' Dual tandem: Two sets of dual wheels, one positioned forward and one positioned aft of the fuselage.

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### Landing Gear Configurations

The block contains three photographs of aircraft with their respective landing gear configurations: 1. B-737 Dual Wheel: A Boeing 737 aircraft with two wheels on the main landing gear. 2. B-757 Dual Tandem: A Boeing 757 aircraft with two sets of dual wheels on the main landing gear. 3. Cessna 182 Single Wheel: A Cessna 182 aircraft with a single wheel on the main landing gear.

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### Landing Gear Configurations

- Double dual tandem (2D/2D2)
- Triple tandem (3D)
- Dual tandem plus triple tandem (2D/3D2)
- Landing gear distribute aircraft weight and thus has an effect on airfield pavement design!

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### Landing Gear Configurations

"2D/2D2"  
Double dual tandem  
Boeing 747

"3D"  
Triple tandem  
Boeing 777

"2D/3D2"  
Dual tandem plus  
triple tandem  
Airbus A-380

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### Landing Gear Configurations

B-777 Triple Tandem

B-747 Double Dual Tandem

A-380 Dual Tandem plus  
Triple Tandem

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### Engine Types

Lycoming Piston

Turboprop

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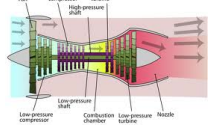
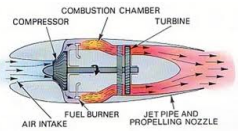
# Jet Engines



Turbojet



Turbofan



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